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Early & Esthetic

OSSTEM IMPLANT SYSTEM Documentations Vol. 4

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Documentations Vol. **4**

Early & Esthetic

Contents

GS System

Selected literature of published Journals

Clinical Study

Pre-Clinical Study

Contents

SS System

Selected literature of published Journals

Clinical Study

Pre-Clinical Study

US System

Selected literature of published Journals

Clinical Study

Pre-Clinical Study

Contents

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

Objectives:

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

Study design:

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

Table 1. Marginal bone loss (mm) around the implants

	No. of implants	1 yr loading	Final F/U
Group I	49	0.63 ± 0.51*	0.73 ± 0.52 †
Group II	24	0.68 ± 0.86*	0.98 ± 1.58 †

F/U, Follow-up.
* P = .725.
† P = .315 (between groups).

Table 2. Comparison in terms of marginal bone loss (mm) 1 year and final follow up after the completion of the upper prosthesis

	No. of implants	1 yr loading	Final F/U
Group I			
Delayed placement	19	0.58 ± 0.57*	0.62 ± 0.54‡
Simultaneous placement	30	0.65 ± 0.48*	0.80 ± 0.51‡
Group II			
Delayed placement	10	0.38 ± 0.48 †	0.43 ± 0.46§
Simultaneous placement	14	0.90 ± 1.02 †	1.37 ± 1.96§

F/U, Follow-up.
* P .649.
† P .148.
‡ P .255.
§ P .153 (between delayed and simultaneous placement in each group).

Results:

Early osseointegration failures of 3 implants in 3 patients (group I: 1 patient, 1 implant; group II: 2 patients, 2 implants) were observed, and revisions were performed for these 3 implant sites, followed by complete prosthodontic treatments. The average height of the remaining alveolar bone before the surgery, immediately after the surgery, and 1 year after the surgery was 4.9 mm, 19.0 mm, and 17.2 mm, respectively, in group I. In group II, the average height of the remaining alveolar bone was 4.0 mm, 19.2 mm, and 17.8 mm before the surgery, immediately after the surgery, and 1 year after the surgery, respectively. The average marginal bone loss 1 year after prosthodontic loading and after 20.8 months' follow-up was 0.6 mm and 0.7 mm, respectively, in group I. A 93.9% success rate was observed for group I, with 3 implants showing bone resorption of >1.5 mm within 1 year of loading. For group II, the average marginal bone loss 1 year after prosthodontic loading and after 19.7 months' follow-up was 0.7 mm and 1.0 mm, respectively. An 83.3% success rate was observed for group II, with 4 implants showing bone resorption of >1.5 mm within 1 year of loading.

Conclusions:

Based on the observations in this study, it was concluded that mixed grafting with demineralized bone matrix for maxillary sinus bone grafting has no significant short-term merit regarding bone healing and stability of implants compared with anorganic bovine bone alone.

Evaluation of Peri-implant Tissue Response according to the Presence of Keratinized Mucosa

Objectives:

The purpose of this study was to evaluate the responses of peri-implant tissue in the presence of keratinized mucosa.

Study design:

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

Table 1. Width of keratinized mucosa according to implant systems

	RBM	SLA	Anodizing	Sig.
Width of DKM (mm)	0.64 ± 0.49	0.40 ± 0.50	0.56 ± 0.51	.157
Width of SKM (mm)	3.26 ± 1.40	3.04 ± 1.29	3.19 ± 1.18	.614

DKM, Insufficient keratinized mucosa, width 2 mm
SKM, sufficient keratinized mucosa, width 2 mm
RBM, Resorbable blasting media (Osstem US II/GS II)
SLA, sandblasted with large grit and acid-etched (Dentium Implantium)
Anodizing, Nobel Biocare TiUnite
other abbreviations as in

Table 2. Crestal bone loss according to implant system

Impalant system	Bone loss (mm)	Sig.
Implantium	0.54 ± 0.83	.36
TiUnite	0.44 ± 0.72	
GS II	0.39 ± 0.71	
US II	0.60 ± 0.84	

P > .05

Results:

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

Conclusions:

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

Clinical and Radiographic Evaluation of Implants with Dual-microthread: 1-year Study

Purpose:
The stability of periodontal condition and marginal bone level were important to achieve long-term success of dental implant treatment. The aim of this study was to evaluate periodontal conditions and marginal bone loss around 67 GS II(Osstem, Seoul, Korea) dental implants with dual-microthread at the neck portion, 1 year after prosthetic loading.

Materials and methods:
Sixty-seven GS II dental implants in 27 patients(mean age; 47.4±14.0 years) who received implant treatments at Pusan National University Hospital, were included in this study. Thirteen US II(Osstem, Seoul, Korea) implants with smooth neck design were selected for the control group. Periodontal and radiographic evaluations were carried out at baseline, 6 months and 12 months after prosthetic loading.

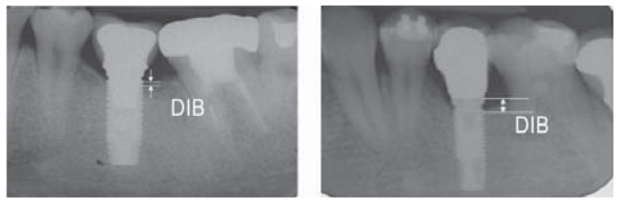


Fig. 1. Distance between implant shoulder and the first visible bone-to-implant contact (DIB).
(A) GS II, (B) US II.

Table 1. Changes of the marginal bone-level between the examination periods (mm, mean±SD)

	Baseline~6month	6months~12month	Baseline-12months
GS II			
Mesial	- 0.21 ± 0.22	- 0.10 ± 0.17	- 0.31 ± 0.31
Distal	- 0.20 ± 0.19	- 0.12 ± 0.16	- 0.33 ± 0.25
US II			
Mesial	- 0.16 ± 0.20	- 0.10 ± 0.12	- 0.26 ± 0.23
Distal	- 0.20 ± 0.20	- 0.12 ± 0.14	- 0.32 ± 0.22

"-" indicates the loss of marginal bone.

Results:
In the GS II group, plaque index(PI), gingival index(GI) and probing depth(PD) increased as time passed. In the US II group, GI and PD increased. Although marginal bone level was lower in the US II group in all evaluation periods, the changes between the periods were not statistically significant($p < .05$). In each period, periodontal parameters were not statistically significant between groups.

Conclusions:
One year after prosthetic loading, GS II and US II dental implants showed similar periodontal conditions and marginal bone response, and were within the criteria of success.

Clinical Retrospective Study of Sinus Bone Graft and Implant Placement

The authors performed the clinical and radiographic evaluation in the 29 patients with sinus bone graft and Osstem implant placement between Sep 2003 and Jan 2006 and got the following results.

Table 1. Survival, Success, Failure rate

Types	Rate
Osseointegration failure	3.7%
Total survival rate	96.3%
Survival of prosthodontics	100%
Success rate 1 year after loading	88%

1. Fifteen complications developed in the 13 patients. Intraoperative sinus membrane perforation and postoperative maxillary sinusitis developed frequently.

2. The mean preoperative residual alveolar bone height was 4.5 mm, postoperative height 18.5 mm, height 1 year after operation 16.9 mm.

3. Three primary osseointegration failures(3.7%) developed in 3 patients.

4. The survival rate of prosthodontics was 100% at the final follow up. The mean marginal bone resorption around the implants was 0.69 mm 1 year after prosthodontic loading. Marginal bone resorption more than 1.5 mm developed in nine implants and the success rate was 88%.

Table 2. Types of sinus bone graft according to stage

Type	No. of Pt	No. Sinus	No. Implants	Preop BH	Postop BH	BH after 1 year	Failure
Simultaneous	19	24	49	4.8 mm	18.4 mm	16.9 mm	1
Delayed	11	16	32	4.0 mm	18.6 mm	17.0 mm	2

No.: Number, Pt: patient, BH: bone height

Table 3. Marginal bone resorption 1 year after prosthodontic loading

Type	No. Implants	MBR	No. implants(MBR > 1.5 mm)	Success rate
Simultaneous	42	0.8 mm	5	88.1%
Delayed	19	0.6 mm	4	86.2%

No.: Number, MBR: marginal bone resorption

Short term Retrospective Clinical Study on GS II, SS III, US III

Recently, Osstem GS II, US III, SS III implant system were introduced. Different form SS III implant system, which is based on one-stage surgery, GS II and US III implant system is based two-stage surgery. GS II which is straight body with dual thread increased both initial and long term stability. US III, SS III designed double tapered body with trapezoidal screw shows good initial stability especially placed in poor bone quality. But up to now, there are few clinical reports on this implant system.

Thus the authors performed the retrospective clinical study of Osstem GS II, US III, SS III implant systems which were placed at Seoul National University Bundang Hospital between August 2004 and September 2007 and got the following results.

Table 1. Primary and secondary stability (Perio-test®)

	GS II	US III
Primary stability	- 0.9	0.8
Secondary stability	- 3.0	- 2.8

Table 2. Primary and secondary stability (Osstell mentor™)

	GS II	US III	SS III
Primary stability	59.0	65.7	61.9
Secondary stability	69.4	73.4	

Table 3. Types of marginal bone resorption

Resorption (mm)	GS II	US III	SS III
6 months after loading	0.3	0.2	0
1 year after loading	0.7	0.7	0
Final follow-up	0.6	0.4	0.4

Table 4. Survival and success rate of each implant systems

	GS II	US III	SS III
Survival rate (%)	97.2	98.1	100
Success rate (%)	94.4	96.3	100

1. GS II systems were used at a variety of sites, however, US III and SS III systems were usually used at maxillary posterior sites.
2. The length of 11.5mm and the diameter of 4 or 5mm implants were usually used.
3. Most implants were usually used for partial fixed prosthesis, however, many GS II fixtures were used for single restoration.
4. All 3 systems got the excellent primary and secondary stability.
5. Mean follow up periods after final prosthetic delivery were 9.9 months in cases of GS II, 9.7 months US III, and 9.6 months SS III. The mean amounts of crestal bone resorption of each systems were 0.6mm, 0.4mm, and 0.4mm.
6. Each survival rates at final follow up time were 97.2% in cases of GS II, 98.1% US III, and 100% SS III. The cases which showed crestal bone resorption more than 1.5mm were 4 cases of GS II and 2 cases of US III. The success rates of each systems were 94.4% in cases of GS II, 96.3% US III, and 100% SS III.

We obtained the favorable clinical results of Osstem GS II, US III, and SS III system during the short observation period confirmed the availability in a variety of clinical cases.

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

Objective:

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

Study design:

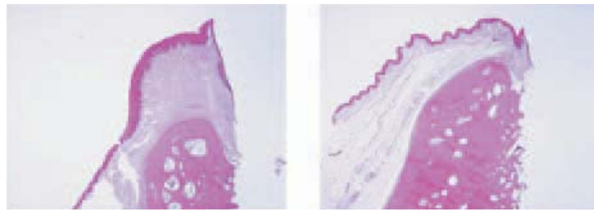
In six mongrel dogs, bilateral edentulated flat alveolar ridges were created in the mandible. After 3 months of healing, 2 implants were placed in each side by either the flap or the flapless procedure. Three months after implant insertion, the peri-implant mucosa was evaluated by using clinical, radiologic,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

Results:

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

Conclusion:

These results indicate that gingival inflammation, the height of junctional epithelium, and bone loss around nonsubmerged implants can be reduced when implants are placed without flap elevation.



A B

Fig. 1. Magnified view of the specimens showing the peri-implant mucosa. (X 12 magnification).
A, Implant placed with a flap.
B, Implant placed without a flap.

Table 1. Parameters of probing depth, gingival index and bleeding on probing around implants when placed with or without a flap

	Flap group	Flapless group	P value
Probing depth (mm)	1.7 ± 0.3	1.0 ± 0.3	.006
Gingival index	0.9 ± 0.5	0	.005
Bleeding on probing	0.7 ± 0.4	0	.005

Table 2. Results of the histometric measurements in both the flap and flapless groups

	Flap group	Flapless group	P value
PM-B (mm)	3.5 ± 0.8	2.2 ± 0.2	.007
PM-aJE (mm)	2.2 ± 0.3	1.2 ± 0.3	.003
aJE-B (mm)	1.3 ± 0.2	1.0 ± 0.2	.018

PM, marginal position of the peri-implant mucosa; B, marginal level of bone-to-implant contact; aJE, apical termination of the junctional epithelium.

Influence of Premature Exposure of Implants on Early Crestal Bone Loss: An Experimental Study in Dogs

Objective:

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

Study design:

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

Results:

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

Conclusion:

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

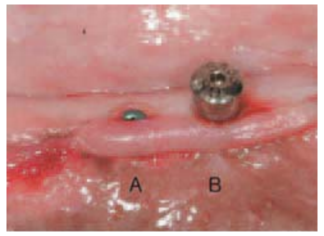


Fig. 1. Clinical features after implant placement. In implant A, a cover screw was connected to the fixture and the incised gingiva was partially removed to expose the implant. In implant B, a healing abutment was connected to the fixture so that the coronal portion of the abutment remained exposed to the oral cavity.

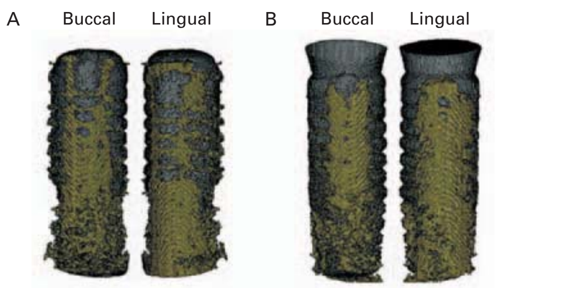


Fig. 2. Three-dimensional micro-CT showing the bone (yellow) around implants (gray).
A, Partially exposed implant.
B, Abutment-connected implant. Buccal, buccal side of the alveolus; lingual, lingual side of the alveolus.

Fatigue Characteristics of Five Types of Implant-Abutment Joint Designs

Introduction:

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

Materials and methods:

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

Table. 1. Implant systems used in this study

Group	Fixture	Abutment	Screw
EXTNTS	US II(US2R413)	TiN Coated(CAR535C)	ASR200
EXANTS	US III(US3R413)	Safe(SFAR542C)	SFSR2S
EXZRTS	Bio Tapered Double Thread (BDT413)	ZioCera(ZAR535)	ASR200
INTIWS	GS II(GS2R4013)	GS Transfer(GSTA5430S)	GSASR
INTICS	SS I(SS1R1813)	Solid (SSS485)	-

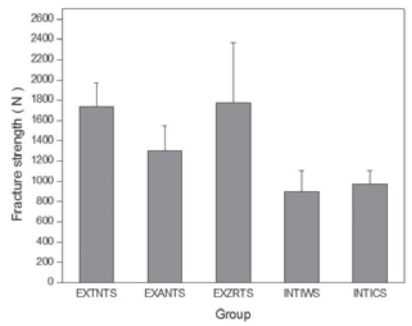


Fig. 1. Static fracture strength of each experimental group.

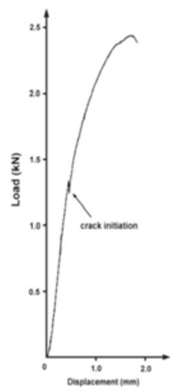


Fig. 2. Load vs displacement curve of EXZRTS group.

Results & Conclusions:

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

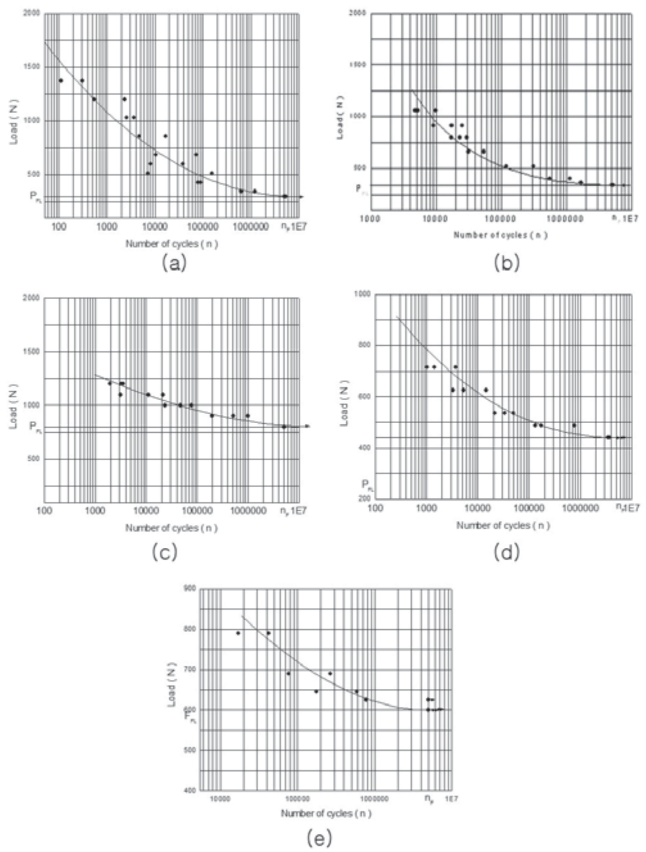


Fig. 3. Fatigue load vs cycles to failure of each experimental group : (a)EXTNTS, (b)EXANTS, (c) EXZRTS, (d) INTIWS, (e) INTICS.

GS System Pre-Clinical Study

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

Statement of problem:

Primary stability at the time of implant placement is related to the level of primary bone contact. The level of bone contact with implant is affected by thread design, surgical procedure and bone quality, etc.

Purpose:

The aim of this study was to compare the initial stability of the various taper implants according to the thread designs, half of which were engaged to inferior cortical wall of type IV bone (Group 1) and the rest of which were not engaged to inferior cortical wall (Group 2) by measuring the implant stability quotient (ISO) and the removal torque value (RTV).

Material & Methods:

In this study, 6 different implant fixtures with 10 mm length were installed. In order to simulate the sinus inferior wall of type IV bone, one side cortical bone of swine rib was removed. 6 different implants were installed in the same bone block following manufacturer's recommended procedures. Total10 bone blocks were made for each group. The height of Group 1 bone block was 10 mm for engagement and that of group 2 was 13 mm. The initial stability was measured with ISO value using Osstell mentor™ and with removal torque using MGT50 torque gauge.

Results:

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

Conclusions:

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

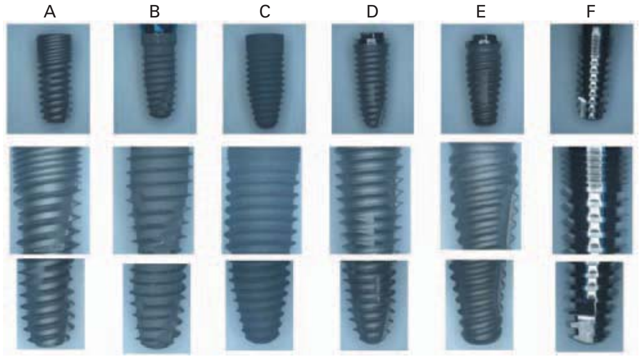


Fig. 1. Characteristics of thread design used in this study.
A. GS III (Osstem, Seoul, South Korea),
B. Osseotite NT® (3i, Floria, USA),
C. Replace® Select (Noble Biocare, Goteborg, Sweden),
D. Sinus Quick (Neoplant, Seoul, South Korea),
E. US III (Osstem, Seoul, South Korea),
F. Hexplant (Warantec, Seoul, South Korea.)

Fig. 2. A. 6 implant ware installed with engageing (Group 1).
B. 6 implants were installed without engaging (Group 2).

Effect of Casting Procedure on Screw Loosening of UCLA Abutment in Two Implant-Abutment Connection Systems

Statement of problem:

The cast abutment has advantages of overcoming angulation problem and esthetic problem. However, when a gold-machined UCLA abutment undergoes casting, the abutment surfaces in contact with the implant may change.

Purpose:

The purpose of this study was to compare the detorque values of prefabricated machined abutments with gold-premachined cast-on UCLA abutments before and after casting in two types of internal implant-abutment connection systems: (1) internal hexagonal joint, (2) internal octagonal joint. Furthermore, the detorque values of two implant-abutment connection systems were compared.

Material & Methods:

Twenty internal hexagonal implants with an 11-degree taper and twenty internal octagonal implants with an 8-degree taper were acquired. Ten prefabricated titanium abutments and ten gold-premachined UCLA abutments were used for each systems. Each abutment was torqued to 30 Ncm according to the manufacturer's instructions and detorque value was recorded. The detorque values were measured once more, after casting with gold alloy for UCLA abutment, and preparation for titanium abutments. Group means were calculated and compared using independent t-test and paired t-test (α=.05).

Table 1. Components and dimensions of tested specimens

	Implant fixtures	Article number	Types of abutments	Article number
Internal hexa				
Group 1 (Titanium abutment)	GS II (4.0×10.0㎜)	GS2R4010R01	Transfer abutment (hex)	GSTA5620
Group 2 (UCLA-type abutment)			GoldCast abutment (hex)	GSGA4510S
Internal octa				
Group 3 (Titanium abutment)	SS II (4.1×11.5㎜)	SS2R1811	SS ComOcta abutment (octa)	SSCA485
Group 4 (UCLA-type abutment)			ComOcta Gold abutment (octa)	COG480S

Results:

The results were as follows: 1. The detorque values between titanium abutments and UCLA-type abutments showed significant differences in internal octagonal implants (p 〈 .05), not in internal hexagonal implants (p 〉.05). 2. In comparison of internal hexagonal and octagonal implants, the detorque values of titanium abutments had significant differences between two connection systems on the initial analysis (p 〈 .05), not on the second analysis (p 〉.05) and the detorque values of UCLA-type abutments were not significantly different between two connection systems (p 〉.05). 3. The detorque values of titanium abutments and UCLA-type abutments decreased significantly on the second analysis than the initial analysis in internal hexagonal implants (p 〈.05), not in internal octagonal implants (p 〉.05).

Conclusions:

Casting procedures of UCLA-type abutments had no significant effect on screw loosening in internal implant-abutment connection systems, and UCLA-type abutments showed higher detorque values than titanium abutments in internal octagonal implants.

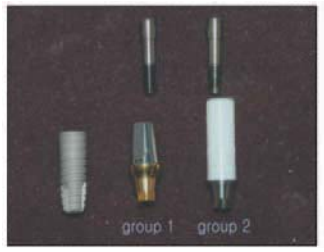


Fig. 1. Internal hexagonal implants, abutments and abutment screws (group 1: Titanium abutment, group 2: UCLA-type abutment).

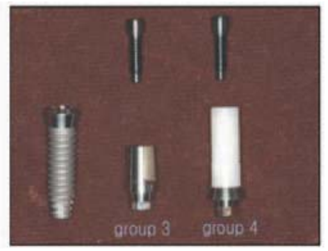


Fig. 2. Internal octagonal implants, abutments and abutment screws (group 3: Titanium abutment, group 4: UCLA-type abutment).

Fig. 3. Titanium abutments after preparation (group 1: internal hexagonal implant, group 3: internal octagonal implant).

Fig. 4. UCLA-type abutments after casting procedure (group 2: internal hexagonal implant, group 4: internal octagonal implant).

Influence of Tightening Torque on Implant-Abutment Screw Joint Stability

Hyon-Mo Shin, Chang-Mo Jeong, Young-Chan Jeon, Mi-Jeong Yun, Ji-Hoon Yoon

J Kor Acad Prosthodont 2008;46(4):396-408

Statement of problem:

Within the elastic limit of the screw, the greater the preload, the tighter and more secure the screw joint. However, additional tensile forces can incur plastic deformation of the abutment screw when functional loads are superimposed on preload stresses, and they can elicit the loosening or fracture of the abutment screw. Therefore, it is necessary to find the optimum preload that will maximize fatigue life and simultaneously offer a reasonable degree of protection against loosening. Another critical factor in addition to the applied torque which can affect the amount of preload is the joint connection type between implant and abutment.

Purpose:

The purpose of this study was to evaluate the influence of tightening torque on the implant-abutment screw joint stability.

Material & Methods:

Respectively, three different amount of tightening torque (20, 30, and 40 Ncm) were applied to implant systems with three different joint connections, one external butt joint and two internal cones. The initial removal torque value and the postload (cyclic loading up to 100,000 cycles) removal torque value of the abutment screw were measured with digital torque gauge. Then rate of the initial and the postload removal torque loss were calculated for the comparison of the effect of tightening torques and joint connection types between implant and abutment on the joint stability.

Results & Conclusions :

1. Increase in tightening torque value resulted in significant increase in initial and postload removal torque value in all implant systems ($p < .05$).

2. Initial removal torque loss rates in SS II system were not significantly different when three different tightening torque values were applied ($p > .05$), however GS II and US II systems exhibited significantly lower loss rates with 40 Ncm torque value than with 20 Ncm ($p < .05$).

3. In all implant systems, postload removal torque loss rates were lowest when the torque value of 30 Ncm was applied ($p < .05$).

4. Postload removal torque loss rates tended to increase in order of SS II, GS II and US II system.

5. There was no correlation between initial removal torque value and postload removal torque loss rate ($p > .05$).

Table 1. Features of implant abutment systems

Implant system	Implant ø mm (grade IV)	Abutment/implant interface	Abutment (grade III)	Abutment screw (Ti-6Al-4V)
US II	4.0 mm	External butt joint	Cemented	Ti-6Al-4Va
SS II	4.1 mm	8° Morse taper (internal octagon)	ComOcta	Ti-6Al-4Va
GS II	4.0 mm	11° Morse taper (internal hexagon)	Transfer	Ti-6Al-4Va

Table 2. Mean values ± SDs of removal torque (Ncm)

Implant system	Tightening torque (Ncm)	Initial*	Postload**
US II	20	15.2 ± 0.8	11.0 ± 0.9
	30	25.6 ± 0.6	20.9 ± 0.3
	40	35.5 ± 0.6	26.6 ± 1.0
SS II	20	16.8 ± 0.8	12.7 ± 0.8
	30	25.5 ± 0.5	24.2 ± 0.5
	40	33.8 ± 1.0	27.4 ± 1.2
GS II	20	15.3 ± 0.7	11.7 ± 0.7
	30	23.9 ± 0.4	20.5 ± 1.1
	40	33.1 ± 0.9	26.4 ± 0.7

GS System References

Clinical Study

1. Young-Kyun Kim, Pil-Young Yun, Su-Gwan Kim, Bum-Soo Kim, Joo L Ong. Evaluation of Sinus Bone Resorption and Marginal Bone Loss after Sinus Bone Grafting and Implant Placement. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2009;107:e21-8.

2. Bum-Soo Kim, Young-Kyun Kim, Pil-Young Yun, Yang-Jin Yi, Hyo-Jeong Lee, Su-Gwan Kim, Jun-Sik Son. Evaluation of Peri-implant Tissue Response according to the Presence of Keratinized Mucosa. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2009;107:e24-8 .

3. Young-Kyun Kim, Pil-Young Yun.The Use of Buccinator Musculomucosal Flap in Implant. Accepted in 2009 for Publication in Int J Periodontics Restorative Dent.

4. Sok-Min Ko, Seung-Il Song, Sung-Jae Park, In-Kyung Lee. Observation of the Change of the Dental Implant Stability and Bone Density Evaluation Methods. J Korean Acad Periodontol 2009;39(2):185-92.

5. Mi-A Kwon, Yong-Deok Kim, Chang-Mo Jeong, Ju-Youn Lee. Clinical and Radiographic Evaluation of Implants with Dual-microthread: 1-year Study. J Korean Acad Periodontol 2009;39(1):27-36.

6. Young-Kyun Kim. Evaluation of User Satisfaction about the Tapered Body Implants. J Korean Cilnical Implant 2009;29(4):367-80.

7. Ka-Young Seol, Su-Gwan Kim, Hak-Kyun Kim, Seong-Yong Moon. A Prospective Study of the Multicenter Clinical Study of Osstem Implant (GS II RBM) in Type IV Bone Quality Patients. Scientific Poster, J Kor Oral Maxillofac Surg 2009;35(Suppl).

8. Jin-Sung Park, Su-Gwan Kim, Hak-Kyun Kim, Seong-Yong Moon. A Prospective Study of the Multi-facilities Clinical Success Rate of Osstem Implant (GS II RBM) in Edentulous Patient. Scientific Poster, J Kor Oral Maxillofac Surg 2009;35(Suppl).

9. Seo-Yoon Kim, Su-Gwan Kim, Hak-Kyun Kim, Seong-Yong Moon. A Prospective Study of the Multi-facilities Clinical Success Rate of Osstem Implant (GS II RBM) in Upper Anterior Teeth after Immediate Extraction. Scientific Poster, J Kor Oral Maxillofac Surg 2009;35(Suppl).

10. Du-Hyeong Lee, Seung-Mi Jeong, Byung-Ho Choi. Effects of Flapless Implant Surgery on Soft Tissue Profiles: A Prospective Clinical Study. Scientific Oral, The 50th Anniversary of KAP, International Prosthodontic Congress & The 6th Biennial Meeting of Asian Academy of Prosthodontics (AAP) 2009.

11. Seong-Yeon Lee, Young-Kyun Kim, Pil-Young Yun, Yang-jin Yi, In-Sung Yeo, Hyo-Jung Lee, Ji-Young Lee. Prospective Clinical Study of Short Implant. Scientific Poster, 4th Congress of the ICOI Korea 2009.

12. Ji-Hoon Park, Young-Kyun Kim, Pil-Young Yun, Yang-Jin Yi, Hyo-Jeong Lee, Jin-young Park. Analysis of Factors in Bone Resorption of Peri-implant Crestal Bone. Scientific Poster, 4th Congress of the ICOI Korea 2009.

13. Moo-Gyung Sung. User Guide of Osstem Implant Systems. Scientific Oral, The 50th Anniversary of KAP, International Prosthodontic Congress & The 6th Biennial Meeting of Asian Academy of Prosthodontics (AAP) 2009.

14. Young-Kyun Kim, Pil-Young Yun, Jae-Hyung Im. Clinical Retrospective Study of Sinus Bone Graft and Implant Placement. J Korean Assoc Maxillofac Plast Reconstr Surg 2008;30(3):294-302.

15. Young-Kyun Kim, Pil-Young Yun, Min-Jung Kwon. Short term Retrospective Clinical Study on GS II, SS III, US III. J Korean Implantology(KAOMI) 2008;12(2):12-22.

16. Hye-Rin Joeng, Bo-Ram Byun, Sok-Min Ko, Seung-Il Song. Rehabilitation of Occlusion Using Orthognathic Surgery and Implant Placement in Partially Edentulous Patient with Mandibular Prognathism: Case Report. J Korean Implantology(KAOMI) 2008;12(4):48-56.

17. Bum-Soo Kim, Young-Kyun Kim, Pil-Young Yun, Yang-Jin Lee. Clinical Evaluation of Sinus Bone Graft Using Allograft and Xenograft. Scientific Poster, 17th Annual Scientific Congress of EAO 2008.

18. Seo-Yoon Kim, Su-Gwan Kim, Hak-Kyun Kim. A Comparision between the Survival Rate of RBM surface implants and Acid-etched surface implants : A prospective 1-year Clinical Study. Scientific Poster, J Kor Oral Maxillofac Surg 2008; 34 (Suppl).

19. Heok-Su Choi, Sun-Hee Oh, Jae-Eun Ju, Se-Hoon Kahm, Seok-Koo Kim. Early loading Protocols for Mandibular Implant Overdentures: Case Report. Scientific Poster, The Korean Academy of Prosthodontics 2008.

20. Su-Jin Choi, Young-Deok Chee, I-Su Jo. Effect of Microthread & Platform Switching on the Maintenance of Marginal Bone Level. Scientific Poster, 46th Congress of the Korean Assoc Maxillofac Plast Reconstr Surg 2007.

21. Young-Kyun Kim, Pil-Young Yun, Dae-Il Son, Bum-Soo Kim, Jung-Won Hwang. Analysis of Clinical Application of Osstem (Korea) Implant System for 6 Years. J Korean Implantology(KAOMI) 2006;10(1):56-65.

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

23. Kyung-Hwan Kwon, Jung-Goo Choi, Seung-Ki Min, Seung-Hwan Oh, Moon-Ki Choi, Jun Lee. GS II Fixture Implant Placement; Review of the Factors Affecting Failure.Scientific Poster, 45th Congress of the Korean Assoc Maxillofac Plast Reconstr Surg 2006.

Pre-Clinical Study

Biology

1. Tae-Min You, Byung-Ho Choi, Jingxu Li, Feng Xuan, Seung-Mi Jeong, Sun-Ok Jang. Morphogenesis of the Peri-implant Mucosa: A Comparison between Flap and Flapless Procedures in the Canine Mandible. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2009;107:66-70.

2. Jung-In Kim, Byung-Ho Choi, Jingxu Li, Feng Xuan, Seung-Mi Jeong. Blood Vessels of the Peri-implant Mucosa: A Comparison between Flap and Flapless Procedures. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2009;107:508-12.

3. Seung-Mi Jeong, Byung-Ho Choi, Jingxu Li, Feng Xuan. Simultaneous Flapless Implant Placement and Peri-implant Defect Correction: An Experimental Pilot Study in Dogs. J Periodontol 2008;79:876-80.

4. Je-Hyeon Yoo, Byung-Ho Choi, Jingxu Li, Han-Sung Kim, Chang-Yong Ko, Feng Xuan, Seung-Mi Jeong. Influence of Premature Exposure of Implants on Early Crestal Bone Loss: An Experimental Study in Dogs. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2008;105:702-6.

5. Seung-Mi Jeong, Byung-Ho Choi, Jingxu Li, Feng Xuan. The Effect of Thick Mucosa on Peri-implant Tissues: An Experimental Study in Dogs. J Periodontol 2008;79(11):2151-5.

6. Chul-Min Park, Su-Gwan Kim, Hak-Kyun Kim, Seong-Yong Moon, Ji-Su Oh, Sung-Mun Baik, Sung-Chul Lim. Effect on the Osteogenesis of Dental Implants after Horizontal Distraction Osteogenesis with Nitrified Distractor. J Korean Assoc Maxillofac Plast Reconstr Surg 2008;30(3):225-31.

7. Sung-Lim Choi, Jin-Hwan Kim, Dong-Hyeon Hwang, Seung-Ki Min. Effects on Er,Cr:YSGG Laser on Peri-implantitis. J Korean Assoc Maxillofac Plast Reconstr Surg 2008;30(5):428-36.

8. Jung-Goo Choi, Su-Jin Choi, Seung-Ki Min, Seung-Hwan Oh, Kyung-Hwan Kwon, Min-Ki Choi, June Lee, Se-Ri Oh. Er:YAG Laser Irradiated Implant Surface Observation with Scanning Electron Microscopy. J Korean Assoc Maxillofac Plast Reconstr Surg 2008;30(6):540-5.

9. Se-Hoon Kahm, Yong-Chul Bae, Seok-Gyu Kim, Je-Uk Park. Determination of Implant Loading Timing in Human: A Pilot Study. Scientific Poster, 17th Annual Scientific Congress of EAO 2008.

10. Tae-Gwan Eom, In-Hee Cho, Myung-Duk Kim, Young-Seok Cho, Kyoo-Ok Choi. Effects of Final Drill Diameter Size on Bone Formation in the Mandible of Micropig. Scientific Poster, 17th Annual Scientific Congress of EAO 2008.

11. Soo-Young Bae, Su-Kyoung Kim, Eun-Jung Kang, Young-Bae An, Gyu-Sub Eom, Tae-Gwan Eom. The Effect of Hydroxyapatite-blasted Titanium Surface Roughness on Osteoblast-like Cell Line MG-63. Scientific Poster, Meeting of the Korean Society for Biomaterials 2008.

12. Jae-Wan Park, Min-Suk Kook, Hong-Ju Park, Uttom Kumar Shet, Choong-Ho Choi, Suk-Jin Hong, Hee-Kyun Oh. Comparative Study of Removal Effect on Artificial Plaque from RBM Treated Implant. J Korean Assoc Maxillofac Plast Reconstr Surg 2007;29(4):309-20.

13. Su-Yeon Cho, Hye-Ran Jeon, Sun-Kyoung Lee, Seoung-Ho Lee, Jun-Young Lee, Keum-Ah Han. The Effect of Ca-P Coated Bovine Mineral on Bone Regeneration around Dental Implant in Dogs. J Korean Acad Periodontol 2006;36(4):913-23.

14. Pil-Kwy Jo, Seung-Ki Min, Kyung-Hwan Kwon, Young-Jo Kim. Scanning Electron Microscopic Study of Implant Surface after Er,Cr:YSGG Laser Irradiation. J Korean Assoc Maxillofac Plast Reconstr Surg 2006;28(5):454-69.

Pre-Clinical Study

Biomechanics

1. Ju-Hee Park, Yiung-Jun Lim, Myung-Joo Kim, Ho-Beom Kwon. The Effect of Various Thread Designs on the Initial Stability of Taper Implants. J Adv. Prosthodont 2009;1:19-25.

2. Mi-Soon Lee, Kyu-Won Suh, Jae-Jun Ryu. Screw Joint Stability under Cyclic Loading of Zirconia Implant Abutments. J Kor Acad Prosthodont 2009;47(2):164-73.

3. Il-Song Park, Sang-Yong Won, Tae-Sung Bae, Kwang-Yeob Song, Charn-Woon Park, Tae-Gwan Eom, Chang-Mo Jeong. Fatigue Characteristics of Five Types of Implant-Abutment Joint Designs. METAL AND MATERIALS International 2008;14(2):133-8.

4. Hyon-Mo Shin, Chang-Mo Jeong, Yonung-Chan Jeon, Mi-Jeong Yeun, Ji-Hoon Yoon. Influence of Tightening Torque on Implant-Abutment Screw Joint Stability. J Kor Acad Prosthodont 2008;46(4):396-408.

5. Chun-Yeo Ha, Chang-Whe Kim, Young-Jun Lim, Myung-Joo Kim. Effect of Casting Procedure on Screw Loosening of UCLA Abutment in Two Implant-Abutment Connection Systems. J Kor Acad Prosthodont 2008;46(3):246-54.

6. Si-Yeob Kim, Byung-kook Kim, Jin-Ho Heo, Ju-Youn Lee, Chang-Mo Jeong, Yong-Deok Kim. Evaluation of Stability of Double Threaded Implant-Emphasis on Initial Stability Using Osstell Mentor™; Part I. J Kor Acad Stomatog Func Occlusion 2007;23(4).

7. Jae-Kyoung Park, Chang-Mo Jeong, Young-Chan Jeon, Ji-Hoon Yoon. Influence of Tungsten Carbide/Carbon Coating of Implant-Abutment Screw on Screw Loosening. J Kor Acad Prosthodont 2008;46(2):137-47.

8. Tae-Sik Lee, Jung-Suk Han, Jae-Ho Yang, Jae-Bong Lee, Sung-Hun Kim. The Assessment of Abutment Screw Stability Between the External and Internal Hexagonal Joint under Cyclic Loading. J Kor Acad Prosthodont 2008;46(6):561-8.

9. Jae-Myoung Cho, Chang-Mo Jeong, Yonung-Chan Jeon, Mi-Jeong Yeun. The Influence of Diameter and Length on Initial Stability in Implant with Similar Surface Area : An Experimental Study. Scientific Poster, J Kor Acad Prosthodont 2008 Conference.

10. Chun-Yeo Ha, Chang-Whe Kim, Young-Jun Lim, Myung-Joo Kim, Ho-Bum Kwon. The Influence of Abutment Angulation on Screw Loosening of Implant in the Anterior Maxilla. Scientific Poster, J Kor Acad Prosthodont 2008 Conference.

11. Gap-Yong Oh, Sung-Hwa Park, Seok-Gyu Kim. Influence of Implant Fixture Design on Implant Primary Stability. J Kor Acad Prosthodont 2006;45(1):98-106.

12. Seung-woo Suh, Myung-Duk Kim, Tae-Gwan Eom. The Effect of Various Taper Angles of the Internal Morse Taper Connection Type Dental Implant Fixture on Their Stress Distribution by FEA Study. Scientific Poster, 16th EAO Conference, 2007.

13. Han-Su Kim, Hee-Jung Kim, Chae-Heon Chung. Detorque Force of TiN-Coated Abutment Screw with Various Coating Thickness after Repeated Closing and Opening. J Kor Acad Prosthodont 2007;45(6):769-79.

14. Chae-Heon Chung. Detorque Force of TiN-coating Abutment Screw with Various Coating Thickness After Repeated Closing and Opening. Scientific Oral, 12th International College of Prosthodontists Meeting, 2007.

15. Jin-Uk Choi, Chang-Mo Jeong, Young-Chan Jeon, Jang-Seop Lim, Hee-Chan Jeong, Tae-Gwan Eom. Influence of Tungsten Carbide/Carbon on the Preload of Implant Abutment Screws. J Kor Acad Prosthodont 2006;44(2):229-42.

16. Mun-Ji Hyun, Cheol-Won Lee, Mok-Kyun Choie. The Effect of Implant Abutment Length, Surface and Cement Type on the Prosthesis Retention. Scientific Poster, 15th EAO conference, 2006.

17. Yong-Suk Cho, Chul-Hyun Jeong , Tae-Soo Kim, Dong-Hoon Jang, Tae-Gwan Eom. Temperature Measurement During Implant-Site Preparation. Scientific Poster, 15th EAO conference, 2006.

18. Ji-Hoon Yoon, Sung-Geun Lee, Chang-Mo Jeong, Tae-Gwan Eom. The Study of Dynamic Behaviour about Implant System with WC/C Coating. Scientific Poster, 15th EAO conference, 2006

19. Ji-Hoon Yoon, Kim KH, Eom SH, Chang-Mo Jeong, Tae-Gwan Eom, Gyeo-Rok Jeon. A Comparative Anlysis of the Accuracy of Implant Techniques. Scientific Poster, 15th EAO conference, 2006.

20. Kwang-Hoon Kim, Chang-Mo Jeong, Ji-Hoon Yoon, Ji-Yun Seong. Effect of Implant-Abutment Joint Design on Dynamic Fatigue Strength. Scientific Poster, 20th AO Conference, 2005.

21. Kwang-Hoon Kim, Chang-Mo Jeong, Ji-Hoon Yoon. The Effect of WC(Tungsten-Carbide) Coating for Abutment Screw on Reliability of Connection. Scientific Poster, 14th EAO conference, 2005.

22. Tae-Gwan Eom, Chang-Mo Jeong, Kwang-Hoon Kim. The Effect of Tightening Torque on Reliability of Joint Stability. Scientific Poster, 14th EAO conference, 2005.

Evaluation of Peri-implant Tissue in Nonsubmerged Dental Implants: a Multicenter Retrospective Study

Objectives:

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.

Study design:

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

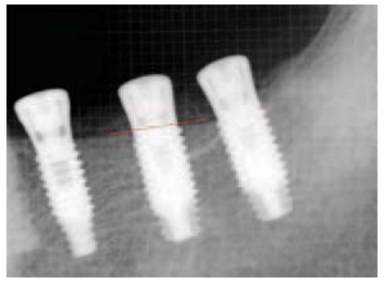


Fig. 1. Periapical radiograph taken immediately after implant placement. In the #36 area, an implant, 4.8 mm in diameter and 10 mm in length, was placed. The crestal bone level in the vicinity of implant was considered as the baseline.

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

A Randomized Clinical One-year Trial Comparing Two Types of Non-submerged Dental Implant

Objectives:

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 SS II Implant system; the control group received the Standard Straumann® Dental Implant System.The diameter and length of the fixture were uniform at 4.1 mmr 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.

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.

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

		Type of Implant				
Duration		Standard Straumann® Dental Implant system		Osstem SS II Implant system		
	Area †	N	Mean ± SD (mm)	N	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.

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

Implant-supported fixed and removable prostheses provide a proper treatment modality with reliable success.
The SS II implants is a one-stage nonsubmerged threaded titanium implants with Resorbable Blasting Media (RBM) surface developed by Osstem company (Seoul, Korea) in Octoher of 2002.

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

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

The results are as follows:

1. Of 439 implants, 17 implants were removed and 4-year cumulative survival rate was 96.1%.
2. 82.3% of 17 failed implants were founded during healing phase, and 94.1% of failed fixtures were removed within 5 months after implantation.
3. Crestal bone around the implants was resorbed to 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. 1. A computer-assisted calibration was carried out for each single site by evaluating the given distance between several threads (pitch: 0.8 mm).

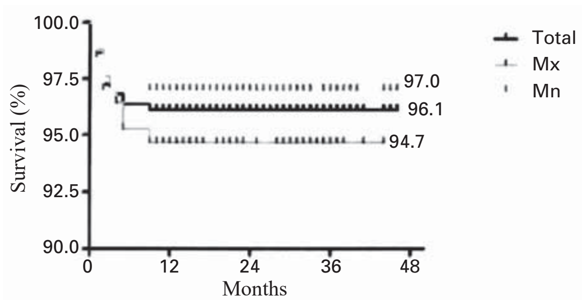


Fig. 2. The 4-year cumulative survival rate: (p > .05).

Multicenter Retrospective Study of Immediate Two Different RBM Surfaced Implant Systems after Extraction

Purpose:
This multicenter retrospective study was performed to evaluate the survival and success rates of immediate placement of US II and SS II Osstem implant (Seoul, Korea) on the maxillary and mandibular anterior and premolar areas.

Materials and methods:
Dental records were obtained in 37 patients who were treated with immediate implantation on the maxillary and mandibular anterior and premolar areas in 6 different clinics. The 98 implants were evaluated both clinically and radiographically using predefined success criteria.

Table 1. Influence of the bone quality on implant success rates

Bone quality	Success rate (%)	
	US II	SS II
Type 1	7 (100)	9 (100)
Type 2	14 (82)	16 (94)
Type 3	15(100)	7 (100)
Type 4	0	4 (100)

Table 2. Crestal bone loss (mm) (Mean±SD)

	US II	SS III
Crestal bone loss	0.44 ± 0.83	0.47 ± 0.69

Table 3. Periodontal evaluations (Mean±SD)

	Gingival inflammation index	Plaque index	Attached gingiva
US II	0.47 ± 0.65	0.55 ± 0.74	2.35 ± 1.03
SS II	0.48 ± 0.77	0.79 ± 0.61	2.59 ± 1.31

Results:
There was no failed implant in all patients. The mean follow up period was 24.7 months (ranged from 12 to 58 months), and 25.1 months (ranged from 16 to 35 months) in US II and SS II implants, respectively. The crestal bone loss was 3 mm in 3 US II implants during 41 months, and in 1 SS II implant during 22 months. The overall success rate was 94.2% and 97.7% in US II and SS II implants, respectively. The age, gender, diameter, or length of implants, and type of surgery were not influenced to the success rate of immediate implantation.

Conclusions:
These results suggest that US II and SS II Osstem implant can be used successfully in immediate implantation on the maxillary and mandibular anterior and premolar areas.

A Retrospective Multicenter Clinical Study of Installed US II / SS II Implants after Maxillary Sinus Floor Elevation

Purpose:

The purpose of this study was to evaluate the Osstem implants (US II/SS II implants) through the retrospective study for the clinical success rate during the installation of the Osstem implants (US II/SS II implants) by using of the procedures of maxillary sinus floor elevation.

Materials and methods:

The current study was researched in the 6 medical institutions: Chonnam National University, Chosun University, Busan DaeDong Hospital, Bundang Seoul National University Hospital, Ap-Seon Clinic, and All Clinic. Based on the total number of 116 patients whose treatment was the installation of the US II/SS II implants with the procedures of the maxillary sinus floor elevation, they were conferred on the dental records of the patients under the joint consultation of the 6 medical institutions. On the dental recording charts, there were included in as the following; the name of the institutions, gender, age, with or without smoking or drinking, with or without the generalized diseases, the height of the alveolar bone on the operational sites, elapsed edentulous state period, the state of the opposed or adjacent teeth, the methods of the maxillary sinus floor elevation, secondary time period for surgery, the lengths, types, and diameters of implants, with or without bone transplantation or the types of bone, postoperative current bone height, current adjacent soft tissue state of the implants, with or without the success of the installations of the implants. We have done our survey with the clinical and radiolographical examinations and dental questionaries. The success and survival rate of the implants was evaluated.

Table 1. Survival and success rate

Type	Survival rate(%)	Success rate(%)
US II	250/252(99.2)	246/252(97.6)
SS II	158/165(95.8)	148/165(89.7)
Total	408/417(97.8)	394/417(94.5)

Results:

1. Total number of the patients with the installation of the US II implants were 62. The 252 numbers of US II implants were installed on the 89 maxillary sinuses. The patient's mean age was 54.1 years old and there were 36 men and 27 women.

2. Total number of patients with the installation of SS II implant were 57. The 165 numbers of SS II implants were planted on the 80 maxillary sinuses. Their mean age was 48.7 years old and there were 37 men and 20 women.

3. The follow-up period was 30.7 months(21-49 mon) on average. The vertical bone loss of installed implants after the procedures of the maxillary sinus elevation was 1.1 mm on average in SS II and 1.3 mm on average in US II. There existed no statistical significance on each group. The mean enlarged bone height after the maxillary sinus floor elevation was 8.2 mm.

4. For the procedures of the maxillary sinus elevation, the Lateral approach technique occupied 87.1%, which was the most used one. In addition, the most frequently used transplanted bone was autogenous bone only which was 72.7% during the maxillary sinus floor elevation.

5. The complication of maxillary sinus floor elevation were perforation of sinus membrane, disesthesia on doner site, exposure of cover screw and exposure of maxillar bone.

6. The survival rate of US II and SS II after maxillary sinus floor elevation was 99.2% and 95.8%, respectively. And the success rate of US II and SS II after maxillary sinus floor elevation was 97.6% and 89.7%, respectively.

Conclusions:

On the evaluation of the analysis of our study, both US II and SS II implants showed the excellent clinical results by use of the procedures of maxillary sinus floor elevation.

For whom? Immediate Implant: The Factors for Successful Immediate Implant

Background and purpose of study:

For successful immediate implant loading, four factors have been suggested recently: operating, host, implant, and occlusal factors. Operating factors include early stability as one of the most important factors of immediate loading and outstanding operating skills. On the other hand, host factors include bone substance and bone quantity of the operating region and healing rate. Design, form, method of surface handling, and length of implants make up the implant factors, whereas occlusal factors include the quantity and quality of occlusal force and prosthesis design. For the last 10 years, serial experiments as following have been done to verify the possibility of immediate loading, even immediate-immediate loading.

Materials and Methods:

Patients
- Korea Univ. Hospital
  75 visiting patients (M:38, F:37)
  Mean age : 51.5 years (26~81years)

Implants
- ITI implant (SLA surface, ø 4.1mm)
  49 patients / 110 fixtures
- Osstem implant (RBM surface, ø 4.1mm)
  26 patients / 61 fixtures

Follow up
- At least 1year / mean 1.65 year

Data analysis
- Criteria of successful osseointegration -Smith & Zarb
  - Marginal bone change of alveolar crest
  (X-ray-the day of operation, 6 months later and 12 months later)

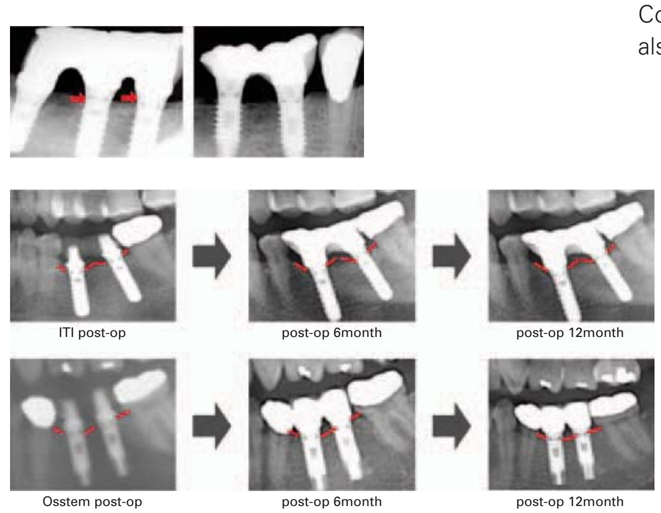


Fig. 1. X-ray data analysis.

Results:

Marginal bone changes (Maxilla vs. Mandible)
- In ITI implant : no significant diffrence(p > .05)
- In Osstem implant : significant diffrence(p > .05)
  (Mx.>Mn. / initial insertion depth)

Marginal bone changes (Length)
- Long fixture showed more marginal bone loss
- Maybe those were installed at ant. Maxilla

Marginal bone changes (Kinds of Prosthesis)
- In ITI implant : significant diffrence(p > .05)
  2-unit vs. 4-unit at operation ~ 6 month
  single vs. 2-unit at 6 month ~ 12 month
- Osstem implant : no significant diffrence(p > .05)

Marginal bone changes (Implant position)
- In ITI implant : no significant diffrence(p > .05) in Mx.
  significant diffrence(p > .05) in Mn.
- In Osstem implant : significant diffrence(p > .05) in Mx.
  no significant diffrence(p > .05) in Mn.
- Generally irregular relationship among implant position

Conclusions:

Most of the marginal bone loss of the immediate-immediate loaded implant was observed within 6 months. And then marginal bone level was relative stabilized in immediate loaded implant.
Implant position, length, number, type of restoration, and bone graft or not, etc. did not show any significant changes to marginal bone loss both in Osstem and ITI Implant patients. (p > .05)
Comparing to reported papers, even in old adult patient also showed satisfactory clinical result, if carefully treated.

Analysis of Clinical Application of Osstem (Korea) Implant System for 6 Years

We evaluated various applications and clinical outcomes of Osstem implants installed by an oral and maxillofacial surgeon from January 2000 to December 2005 retrospectively.

1. Total 534 fixtures of Osstem implant system were installed to 133 patients.

2. The patients ranged from 20 to 95 years in age (mean 51.5). There were 72 male and 61 female patients.

3. From the 534 fixtures, 305 fixtures were installed in mandible and 229 fixtures in maxilla.

4. The major operating method was guided bone regeneration with implant fixture installation (66 patients), followed by osteotome technique (32), simple technique without supplementary procedure (28), and others.

5. From the 534 fixtures in 133 patients, early failure of implant was found in 13 fixtures (2.4%) from 10 patients (7.5%). From the 318 fixtures in 98 patients who have functioned for more than 1 year after prosthesis delivery, there were two failures and 97.6% 6 years cumulative survival rate. One case failed after 2.5 years, and the other case after 4 years.

6. Major causes of early failure were detected as lack of initial stability (4 patients).

Table 1. Surgery distribution

Surgery	Number
Simple placement	28
GBR	66
Sinus bone graft	22 (simultaneous: 20 delayed: 2)
Extraction and Immediate placement	20
Osteotome Tq.	32
Redge splitting	7
Inferior nerve repositioning	4
Distraction osteogenesis	3
Segmental osteotomy	4
Etc.	17

Table 2. Early failure according to surgery

Types of surgery	No. of patients	No of fixtures
Ext. and immediate implant, GBR	2	3
Simple placement	3	4
BAOSFE	1	1
Sinus graft and simultaneous placement	3	4
Sinus graft and delayed placement	1	1

Table 3. 6 years cumulative survival rate

Period (F/U) (year)	Number of Implants	Survival	Failure	Failure rate (%)	Drop-out	Survival rate(%)
Placement ~ 1	534	521	13	2.4		97.6
1~2	318	318	0	0	216	97.6
2~3	129	128	1	0.8	189	96.8
3~4	101	100	1	1	28	95.8
4~5	81	81	0	0	20	95.8
5~6	81	81	0	0	0	95.8

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

Background:

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.

Methods:

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

Results:

The plaque control group had greater vertical alveolar ridge height (9.7 ± 0.5 mm) than the group without plaque control (7.4 ± 0.7 mm; $p < .05$). In the plaque control group, the average bone height was greater with the abutment-connected implant (10.1 ± 0.5 mm) than with the partially exposed implant (9.3 ± 0.5 mm; $p < .05$). In the group without plaque control, the average bone height was greater with the partially exposed implant (8.2 ± 0.6 mm) than with the abutment-connected implant (6.5 ± 0.7 mm; $p < .05$).

Conclusion:

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.

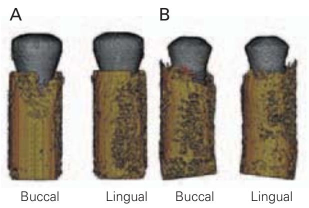


Fig. 1. A) Three-dimensional micro-CT of an abutment-connected implant from the plaque control group demonstrating bone (yellow) around the implants (gray).
B) Three-dimensional micro-CT of a partially exposed implant from the plaque control group demonstrating bone (yellow) around the implants (gray).

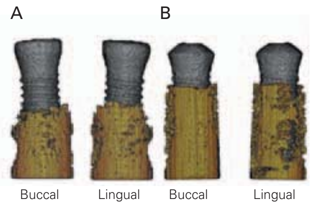


Fig. 2. A) Three-dimensional micro-CT of an abutment-connected implant from the group without plaque control demonstrating bone (yellow) around the implants (gray).
B) Three-dimensional micro-CT of a partially exposed implant from the group without plaque control demonstrating bone (yellow) around the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

Peri-implant Bone Reactions at Delayed and Immediately Loaded Implants: An Experimental Study

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.

Study design:
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 20 N 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; $p < .05$).

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

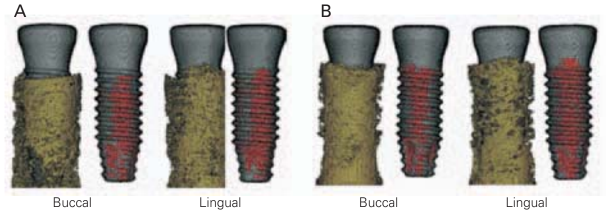


Fig. 1. Three-dimensional micro-CT showing the bone (yellow) and the bone-to-implant contact area (red) around the implants (gray):
A, immediately loaded implant;
B, delayed loading implant. Buccal, buccal side of the alveolus;
lingual, lingual side of the alveolus.

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

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.

Study design:
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) ($p < .05$).

Conclusion:
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.

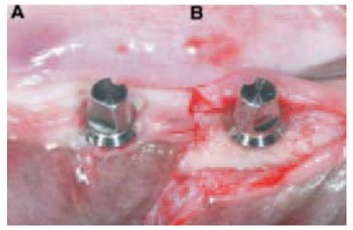


Fig. 1. Clinical feature after implant placement.
A: Flapless surgery
B: Flap surgery

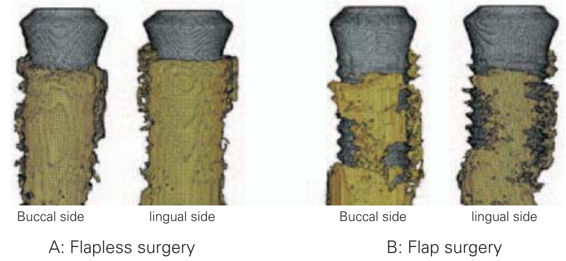


Fig. 2. Three-dimensional micro-CT showing the bone (yellow) around the implants (gray).

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

SS System Pre-Clinical Study

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

Statement of problem:

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.

Purpose:

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.

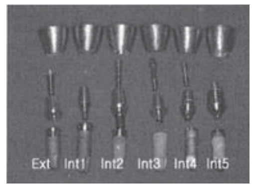


Fig. 1. Regular diameter implants, abutments, abutment screws and titanium crowns.

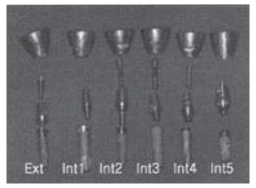


Fig. 2. Wide diameter implants, abutments, abutment screws and titanium crowns.

Results & Conclusions :

The results were as follows:

1. The initial detorque values of six different implant-abutment connections were not significantly different($p > .05$).
2. The detorque values after one million dynamic cyclic loading were significantly different ($p < .05$).
3. The SS II 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, SS II 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 US II Selftapping Implant	Hexed, collar 1mm, height 5.5mm
Ext(W)		Hexed, collar 1mm, height 5.5mm
Int1(R)	OSSTEM SS II 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 : external, Int : internal

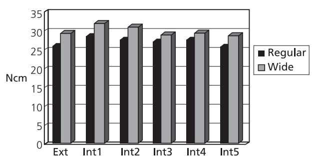


Fig. 3. Mean initial detorque value.

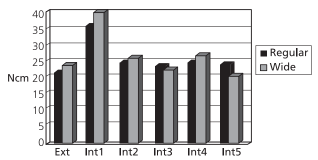


Fig. 4. Mean detorque values after cyclic loading.

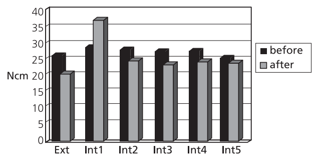


Fig. 5. Mean detorque values of regular diameter implants.

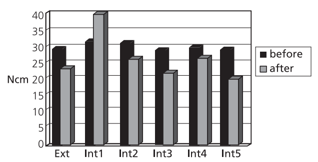


Fig. 6. Mean detorque values of wide diameter implants.

SS System References

Clinical Study

1. Young-Kyun Kim, Su-Gwan Kim, Hee-Kyun Oh, Yong-Geun Choi, Yong-Seok Cho, Young-Hak Oh, Jun-Sik Son. Evaluation of Peri-implant Tissue in Nonsubmerged Dental Implants: a Multicenter Retrospective Study. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2009;108(2):189-95.

2. Jong-Chul Park, Seung-Ryong Ha, Soung-Min Kim, Myung-Jin Kim, Jai-Bong Lee, and Jong-Ho Lee. A Randomized Clinical One-year Trial Comparing Two Types of Non-submerged Dental Implant. Accepted in 2009 for Publication in Clin Oral Impl Res.

3. Young-Kyun Kim, Pil-Young Yun, Su-Gwan Kim, Bum-Soo Kim, Joo L Ong. Evaluation of Sinus Bone Resorption and Marginal Bone Loss after Sinus Bone Grafting and Implant Placement. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2009;107:e21-8.

4. Jong-Chul Park, Hyun-Duck Kim, Soung-Min Kim, Myung-Jin Kim, Jong-Ho Lee. A Comparison of Implant Stability Quotients Measured Using Magnetic Resonance Frequency Analysis from Two Directions: Prospective Clinical Study during the Initial Healing Period. Submitted to Clin Oral Impl Res.

5. Hye-Ran Jeon, Myung-Rae Kim, Dong-Hyun Lee, Jung-Sub Shin, Nara-Kang. Four-year Survival Rate of RBM Surface Internal Connection Non-Submerged Implants and the Change of the Peri-Implant Crestal Bone. J Korean Assoc Maxillofac Plast Reconstr Surg 2009;31(3):237-42.

6. In-Seong Jeon. Clinical Application of Osstem SS III Implant System. J Korean Dental Success 2009;29(8):829-37.

7. Seong-Yeon Lee, Young-Kyun Kim, Pil-Young Yun, Yang-jin Yi, In-Sung Yeo, Hyo-Jung Lee, Ji-Young Lee. Prospective Clinical Study of Short Implant. Scientific Poster, 4th Congress of the ICOI Korea 2009.

8. Moo-Gyung Sung. User Guide of Osstem Implant Systems. Scientific Oral, The 50th Anniversary of KAP, International Prosthodontic Congress & The 6th Biennial Meeting of Asian Academy of Prosthodontics (AAP) 2009.

9. Sung-Moon Back, Min-Suk Oh, Su-Kwan Kim. A Retrospective Study on the Clinical Success Rate of Osstem Implant. Key Engineering Materials 2008;361-363:1331-4.

10. Su-Gwan Kim, Daniel Sun-Ho Oh. Placement of Calcium Metaphosphate-coated Dental Implants in the Posterior Maxilla: Case Reports. Hosp Dent (Tokyo)2008;20(1):39-43.

11. Hong-Ju Park, Min-Suk Kook, Su-Gwan Kim, Young-Kyun Kim, Yong-Seok Cho, Gab-Lim Choi, Young-Hak Oh, Hee-Kyun Oh. Multicenter Retrospective Study of Immediate Two Different RBM Surfaced Implant Systems after Extraction. J Korean Assoc Maxillofac Plast Reconstr Surg 2008;30(3):258-65.

12. Min-Suk Kook, Hong-Ju Park, Su-Gwan Kim, Young-Kyun Kim, Yong-Seok Cho, Gab-Lim Choi, Young-Hak Oh, Hee-Kyun Oh. A Retrospective Multicenter Clinical Study of Installed US II / SS II Implants after Maxillary Sinus Floor Elevation. J Kor Oral Maxillofac Surg 2008;34:341-9.

13. Young-Kyun Kim, Pil-Young Yun, Jae-Hyung Im. Clinical Retrospective Study of Sinus Bone Graft and Implant Placement. J Korean Assoc Maxillofac Plast Reconstr Surg 2008;30(3):294-302.

14. Young-Kyun Kim, Pil-Young Yun, Min-Jung Kwon. Short term Retrospective Clinical Study on GS II, SS III, US III. J Korean Implantology(KAOMI) 2008;12(2):12-22.

15. Ju-Hyon Lee, Hyun-Gi Min, Jin-Sook Lee, Myung-Rae Kim, Na-Ra Kang. Resonance Frequency Analysis in Non-Submerged, Internal Type Implant with Sinus Augmentation Using Deproteinized Bovine Bone Mineral. J Korean Assoc Maxillofac Plast Reconstr Surg 2008;30(6):554-60.

16. Bum-Soo Kim, Young-Kyun Kim, Pil-Young Yun, Yang-Jin Lee. Clinical Evaluation of Sinus Bone Graft Using Allograft and Xenograft. Scientific Poster, 17th Annual Scientific Congress of EAO 2008.

17. Young-Kyun Kim, Hee-Kyun Oh, Su-Gwan Kim, Yong-Geun Choi, Yong-Seok Cho, Young-Hak Oh. Multicenter Retrospective Clinical Study of Osstem SS II Implant System. J Korean Implantology(KAOMI) 2007;11(1):20-31.

18. Jong-Jin Kwon. For whom? Immediate Implant: The Factors for Successful Immediate Implant. J Korean Cilnical Implant 2007;35(5):20-38.

19. Jong-Jin Kwon, Tae-Sung Kim. Retrospective Study of Immediately Loaded Implants among Elderly Patients with Diabetes Mellitus. Scientific Oral, 46th Congress of the Korean Assoc Maxillofac Plast Reconstr Surg 2007.

20. Min-Seok Oh, Su-Gwan Kim, Hak-Kyun Kim, Seong-Yong Moon. Prospective Clinical Study of Two Osstem SS II Implant Systems with Different Surfaces in Partially Edentulous Patients. Scientific Oral, 2nd Congress of the ICOI Korea 2007.

21. Young-Kyun Kim, Pil-Young Yun, Dae-Il Son, Bum-Soo Kim, Jung-Won Hwang. Analysis of Clinical Application of Osstem (Korea) Implant System for 6 Years. J Korean Implantology(KAOMI) 2006;10(1):56-65.

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

23. Young-Kyun Kim, Jung-Won Hwang, Pil-Young Yun, Su-Gwan Kim, Chae-Heon Chung, Yong-Gun Choi, Sung-Il Song. Multicentric Prospective Clinical Study of Korean Implant System: Early Stability Measured by Periotest. J Korean Dent Assoc 2004;42(12):873-81.

Pre-Clinical Study

Biology

1. Joo-Young Lee, Su-Gwan Kim, Seong-Yong Moon, Sung-Chul Lim, Joo L. Ong, Kwang-Min Lee. A Short-term Study on Immediate Functional Loading and Immediate Nonfunctional Loading Implant in Dogs: Histomorphometric Evaluation of Bone Reaction. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2009;107:519-24.

2. Se-Hoon Kim, Byung-Ho Choi, Jingxu Li, Han-Sung Kim, Chang-Yong Ko, Seung-Mi Jeong, Feng Xuan, Seoung-Ho Lee. Peri-implant Bone Reactions at Delayed and Immediately Loaded Implants: An Experimental Study. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2008;105:144-8.

3. Sung-Han Sul, Byung-Ho Choi, Jingxu Li, Seung-Mi Jeong, Feng Xuan. Histologic Changes in the Maxillary Sinus Membrane after Sinus Membrane Elevation and the Simultaneous Insertion of Dental Implants without the Use of Grafting Materials. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2008;105:e1-5.

4. Sung-Han Sul, Byung-Ho Choi, Jingxu Li, Seung-Mi Jeong, Feng Xuan. Effects of Sinus Membrane Elevation on Bone Formation around Implants Placed in the Maxillary Sinus Cavity: An Experimental Study. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2008;105:684-7.

5. Byung-Ho Choi, Jingxu Li, Han-Sung Kim, Chang-Yong Ko, Seung-Mi Jeong, Feng Xuan. Comparison of Submerged and Nonsubmerged Implants Placed without Flap Reflection in the Canine Mandible. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2008;105:561-5.

6. Seung-Mi Jeong, Byung-Ho Choi, Jingxu Li, Han-Sung Kim, Chang-Yong Ko, Seoung-Ho Lee. Influence of Abutment Connections and Plaque Control on the Initial Healing of Prematurely Exposed Implants: An Experimental Study in Dogs. J Periodontol 2008;79(6):1070-4.

7. Soo-Young Bae, Su-Kyoung Kim, Eun-Jung Kang, Young-Bae An, Gyu-Sub Eom, Tae-Gwan Eom. The Effect of Hydroxyapatite-blasted Titanium Surface Roughness on Osteoblast-like Cell Line MG-63. Scientific Poster, Meeting of the Korean Society for Biomaterials 2008.

8. 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. Flapless Implant Surgery: An Experimental Study. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2007;104:24-8.

9. Seoung-Ho Lee, Byung-Ho Choi, Jingxu Li, Seung-Mi Jeong, Han-Sung Kim, Chang-Yong Ko. Comparison of Corticocancellous Block and Particulate Bone Grafts in Maxillary Sinus Floor Augmentation for Bone Healing around Dental Implants. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2007;104(3):324-8.

10. Jae-Wan Park, Min-Suk Kook, Hong-Ju Park, Uttom Kumar Shet, Choong-Ho Choi, Suk-Jin Hong, Hee-Kyun Oh. Comparative Study of Removal Effect on Artificial Plaque from RBM Treated Implant. J Korean Assoc Maxillofac Plast Reconstr Surg 2007;29(4):309-20.

11. Ki-Jong Sun, Jae-Young Park, Eun-Gyeong Jeong, Mee-Ran Shin, Yun-Sang Kim, Sung-Hee Pi, Hyung-Shik Shin, Hyung-Keun You. Comparative Study of Osseointegration on Different Immediate Implants in Extraction Sockets of Beagle Dogs. J Korean Acad Periodontol 2007;37(2):209-21.

12. Young-Jong Kim, Su-Gwan Kim, Young-Kyun Kim, Suk-Young Kim. Analysis of Failed Implants. J Korean Implantology (KAOMI) 2007;11(3):46-58.

Pre-Clinical Study

Biomechanics

1. Il-Song Park, Sang-Yong Won, Tae-Sung Bae, Kwang-Yeob Song, Charn-Woon Park, Tae-Gwan Eom, Chang-Mo Jeong. Fatigue Characteristics of Five Types of Implant-Abutment Joint Designs. METAL AND MATERIALS International 2008;14(2):133-8.

2. Hyon-Mo Shin, Chang-Mo Jeong, Young-Chan Jeon, Mi-Jeong Yun, Ji-Hoon Yoon. Influence of Tightening Torque on Implant-Abutment Screw Joint Stability. J Kor Acad Prosthodont 2008;46(4):396-408.

3. Chun-Yeo Ha, Chang-Whe Kim, Young-Jun Lim, Myung-Joo Kim. Effect of Casting Procedure on Screw Loosening of UCLA Abutment in Two Implant-Abutment Connection Systems. J Kor Acad Prosthodont 2008;46(3):246-54.

4. Ho-Yeon Won, In-Ho Cho, Joon-Seok Lee. A Study of Smartpeg™'s Lifetime according to Sterilization for Implant Stability. J Kor Acad Prosthodont 2008;46(1):42-52.

5. Jae-Kyoung Park, Chang-Mo Jeong, Young-Chan Jeon, Ji-Hoon Yoon. Influence of Tungsten Carbide/Carbon Coating of Implant-Abutment Screw on Screw Loosening. J Kor Acad Prosthodont 2008;46(2):137-47.

6. Si-Yeob Kim, Byung-kook Kim, Jin-Ho Heo, Ju-Youn Lee, Chang-Mo Jeong, Yong-Deok Kim. Evaluation of Stability of Double Threaded Implant-Emphasis on Initial Stability Using Osstell Mentor™; Part I. J Kor Acad Stomatog Func Occlusion 2007;23(4).

7. Chun-Yeo Ha, Chang-Whe Kim, Young-Jun Lim, Myung-Joo Kim, Ho-Bum Kwon. The Influence of Abutment Angulation on Screw Loosening of Implant in the Anterior Maxilla. Scientific Poster, J Kor Acad Prosthodont 2008 Conference.

8. Jung-Bo Huh, Sok-Min Ko. The Comparative Study of Thermal Inductive Effect Between Internal Connection and External Connection Implant in Abutment Preparation. J Kor Acad Prosthodont 2007;45(1):60-70.

9. Gap-Yong Oh, Sung-Hwa Park, Seok-Gyu Kim. Influence of Implant Fixture Design on Implant Primary Stability. J Kor Acad Prosthodont 2006;45(1):98-106.

10. Chae-Heon Chung. Detorque Force of TiN-coating Abutment Screw with Various Coating Thickness After Repeated Closing and Opening. Scientific Oral, 12th International College of Prosthodontists Meeting.

11. Jin-Uk Choi, Chang-Mo Jeong, Young-Chan Jeon, Jang-Seop Lim, Hee-Chan Jeong, Tae-Gwan Eom. Influence of Tungsten Carbide/Carbon on the Preload of Implant Abutment Screws. J Kor Acad Prosthodont 2006;44(2):229-42.

12. Yong-Suk Cho, Chul-Hyun Jeong , Tae-Soo Kim, Dong-Hoon Jang, Tae-Gwan Eom. Temperature Measurement During Implant-Site Preparation. Scientific Poster, 15th EAO conference, 2006.

13. Ji-Hoon Yoon, Sung-Geun Lee, Chang-Mo Jeong, Tae-Gwan Eom. The Study of Dynamic Behaviour about Implant System with WC/C Coating. Scientific Poster, 15th EAO conference, 2006.

14. Byung-Kook Kim, Tae-Gwan Eom, Kyu-Ok Choi, Lee GH. Correlation Between Insertion Torque and Primary Stability of Dental Implant by Block Bone Test. Scientific Poster, 15th EAO conference, 2006.

15. Chun-Yeo Ha, Chang-Whe Kim, Young-Jun Lim, Kyung-Soo Jang. The Effect of Internal Implant-Abutment Connection and Diameter on Screw Loosening. J Kor Acad Prosthodont 2005;43(3):379-92.

16. Kwang-Hoon Kim, Chang-Mo Jeong, Ji-Hoon Yoon, Ji-Yun Seong. Effect of Implant-Abutment Joint Design on Dynamic Fatigue Strength. Scientific Poster, 20th AO Conference, 2005.

17. Tae-Gwan Eom, Chang-Mo Jeong, Kwang-Hoon Kim. The Effect of Tightening Torque on Reliability of Joint Stability. Scientific Poster, 14th EAO conference, 2005.

18. Ji-Hoon Yoon, Chang-Mo Jeong, Tae-Gwan Eom, Mi-Hyun Cheon. Effect Joint Design on Static and Dynamic Strength. Scientific Poster, 14th EAO conference, 2005.

19. Tae-Hee Byun, Kwang-Hoon Kim. Study on the Adaptation to the Investment Water-Powder Ratio by Abutment and Casting Crown. Scientific Poster, Kor Dent Technician Associate 2005 Conference.

20. Byung-Gi Cho, Jae-Ho Ryu. Study of Possibility Direct Casting on Titanium Abutment. Scientific Poster, Kor Dent Technician Associate 2005 Conference.

21. Byung-Soo Bae, Jae-Ho Ryu. Investigation of the Resin Adhesion and Task Convenience for Surface Shape. Scientific Poster, Kor Dent Technician Associate 2005 Conference.

SS System References

A Retrospective Study on the Clinical Success Rate of Osstem Implant

Introduction:

It is important to analyze the causes of implant failure. Therefore, we examined the records of patients who received an Osstem implant at the dental clinic at Chosun University, Korea, between January 2002 and December 2005. Implant success and cumulative survival rates were evaluated by assessing clinical examination results, medical records, and radiographs. The success rate was assessed according to gender, implant placement area, fixture diameter and length, and the presence or absence of maxillary sinus surgery.

Materials and Methods:

The study was performed on 247 patients (144 male, 103 female). The patients ranged in age from the teens to the 70s. The patients had no systemic diseases that would have been a contraindication for implant surgery. Based on the examination records, the following were analyzed: patient gender and age distribution, implant placement location, fixture diameter and length, presence or absence of maxillary sinus surgery, and cause of implant failure.

Table 1. Success rate following maxillary sinus lifting (total, 24 cases)

Outcome	Perforation	Non-perforation
Success	5 (20.83%)	15 (62.5%)
Failure	3 (10.25%)	1 (4.1%)

Table 2. Causes of implant failure

Causes	Implants (%)
Poor bone quality: Cases implanted in natural bone Cases with simultaneous maxillary sinus lifting surgery	12 (42.9%) 8 4
Poor initial stability	8 (28.5%)
Dehiscence formation	1 (3.5%)
Perforation in the maxillary sinus	3 (10.7%)
Erroneous implant direction	1 (3.5%)
Exposure of the blocking membrane	2 (7.1%)
Reimplantation due to implant fracture	1 (10.7%)
Total	28

Results:

1. Success rate according to patient gender and age distribution.

   The highest success rates occurred among those in the 40s age group (31%) for male patients and the 50s age group (28%) for female patients. In both male and female patients, the failure rate increased with increasing age.

2. Success rate according to implant placement location.

   In all age groups, implants were placed most frequently in the mandibular molar tooth area (41% of total) and maxillary molar tooth area (18% of total). The implant failure rate was highest in the maxillary molar tooth area (8/88, 9%) and mandibular molar tooth area (16/192, 8%). Among the maxillary molar tooth cases, maxillary sinus lifting was performed in 24 cases, and failure occurred in four of these.

3. Classification according to implant area and fixture diameter and length.

   The location and fixture size was determined for each of the 479 implants. The most frequently implanted areas were the mandibular molar tooth, maxillary molar tooth, and maxillary pre-molar tooth areas. The implant diameters were 3.3, 3.75, 4.1 and 5.1 mm, and the lengths ranged from 10 to 15 mm. The most frequently used implant had a diameter of 4.1 mm and a length of 13 mm.

4. Success rate following maxillary sinus lifting surgery (Table 1).

   Maxillary sinus lifting was performed during the placement of 24 implants, and four of these implants failed. Perforation developed during the placement of eight implants, and three of these failed.

5. Causes of implant failure (Table 2).

   Among the 479 implants, there were 28 failures. The most frequent causes of failure, in decreasing order, were poor bone quality, poor initial stability, and perforation in the maxillary sinus. In this study, maxillary sinus lifting was performed simultaneously with implantation in 24 patients, and bone union failed in four cases, for a success rate of 83%.

A Retrospective Evaluation of Implant Installation with Maxillary Sinus Augmentation by Lateral Window Technique

Purpose:

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

Materials and Methods:

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

Table 1. Survival rates of simultaneously installed implants

Residual bone height (mm)	No. of implant	No. of failed implant	Survival rate(%)
> 7	106	2	98.1
7 - 3	132	0	100
< 3	11	0	100
Total	249	2	99.2

Table 2. Survival rates of delayed installed implants

Residual bone height (mm)	No. of implant	No. of failed implant	Survival rate(%)
> 7	9	0	100
7 - 3	48	0	100
< 3	84	0	100
Total	141	0	100

Results:

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

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

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

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

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

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

Conclusions:

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

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

The purpose of this study is to evaluate the success rate of the Osstem US II(Seoul, Korea) placed in the edentulous area of type 4 bone quallity.

178 US II implants that had been inserted between 1997 and 2005 were followed up for mean 29.4 months. With medical records and radiograghs we analysis the distribution of patients' age and gender, position of implant, the kind of surgical technique, the type of prostheses, amount of bone resorption survival rate and success rate of implants. From these analysis we got the following results.

In the distribution of implants by site, 167 implants were placed on maxilla and only 11 implants on mandibule. And the resorption of crestal bone more than 1mm was measured at only 5 implants. The mean plaque, gingival inflammatory and calculus index were measured 0.56, 0.31, 0.01. The survival rate was 100% and success rate was 98.8% during 29.4 months of mean following up period.

As a result, we got the excellent clinical results of US II implant system at bone quallity of type 4.

Table 1. Distribution of operation methods

Operation method	No. of implants
Conventional method	54
SL via lateral window	114
SL via osteotome technique	9
GBR	1

Table 2. Distribution of implants by type of prostheses

Prostheses	No. of implants
Single	3
Fixed partial	136
Fixed complete	33
Others	6

Table 3. Distribution of implants by bone resorption

Amount of bone resorption (mm)	No. of implants
None	165
0~0.9	2
1.0~2.0	5
>2.0	0

Multicenter Retrospective Clinical Study of Osstem US II Implant System in Complete Edentulous Patients

In this study, we analyzed data for edentulous patients from multiple centers after installation of the Osstem US II system in a retrospective study of patient gender, age, implant area, additional surgery, type of prosthesis, and the implant survival and success rates. We then analyzed the success rate after prosthetic restoration using implants in completely edentulous patients to validate the usefulness of the US II system.

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

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

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

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

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

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

6. The mean calculus index for the soft tissues near the implants in 215 cases was 0.11, and the gum inflammation index assessed in 226 cases averaged 0.34. The plaque index measured in 225 cases averaged 0.55, and the width of the attached gingiva measured in 222 cases averaged 2.05 mm.

7. For implant surgery, no additional surgery was performed in 161 cases (58.3%); maxillary sinus elevation via a lateral window was performed in 45 cases (16.3%); guided bone regeneration (GBR) was performed in 42 cases (15.2%); simultaneous maxillary sinus elevation and GBR were performed in 6 cases (2.1%); and veneer grafting was performed in 10 cases (3.6%).

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

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

Table 1. Distribution of implants by bone resorption

Amount of bone resorption (mm)	No. of implants
None	181
0~0.9	6
1.0~2.0	35
>2.0	9

Table 2. Survival rate on total implant

Implant statue	No. of implants
Survival count	274
Fail count	2
Total	276
Survival (percentage)	99.27%

US System Clinical Study

Retrospective Multicenter Cohort Study of the Clinical Performance of 2-stage Implants in South Korean Populations

Purpose:

To evaluate long-term follow-up clinical performance of dental implants in use in South Korean populations.

Materials and Methods:

A retrospective multicenter cohort study design was used to col-lect long-term follow-up clinical data from dental records of 224 patients treated with 767 2-stage endosseous implants at Ajou University Medical Center and Bundang Jesaeng Hospital in South Korea from June 1996 through December 2003. Exposure variables such as gender, systemic disease, location, implant length, implant diameter, prosthesis type, opposing occlusion type, and date of implant placement were collected. Outcome variables such as date of implant failure were measured.

Results:

Patient ages ranged from 17 to 71.7 years old (mean age, 45.6 years old). Implants were more frequently placed in men than in women (61% versus 39%, or 471 men versus 296 women). Systemic disease was described by 9% of the patients. All implants had hydroxyapatite-blasted surfaces. Most of the implants were 3.75 mm in diameter. Implant lengths 10 mm, 11.5 mm, 13 mm, and 15 mm were used most often. Differences of implant survival among different implant locations were observed. Implants were used to support fixed partial dentures for the majority of the restorations. The opposing dentition was natural teeth for about 50% of the implants. A survival rate of 97.9% (751 of 767) was observed after 4.5 years (mean, 1.95 $\pm$ 1.2 years).

Conclusions:

Clinical performance of 2-stage dental implants demonstrated a high level of predictability. The results achieved with a South Korean population did not differ from results achieved with diverse ethnic groups (Cohort Study).

Table 1. Implant Failure and Survival by Year

Year	Implants at start of interval	Implants lost to follow-up	Failure	% of total failure	Cumulative failure
1	767	754	13	81.3	98.3
2	754	752	2	12.5	98.0
3	752	751	1	6.2	97.9
4	751	751	0	0	97.9
4.5	751	751	0	0	97.9

Multicentric Prospective Clinical Study of Korean Implant System: Early Stability Measured by Periotest®

Purpose:

A number of dental implant systems have been developed worldwide. And, on the base of experimental and clinical studies, considerable technical improvement and production of qualified dental implant system was accomplished. As a member of Korean implant system, Osstem implant system has relatively long-term accumulated clinical data. Though there were many studies on the Osstem implant system, multicentric prospective study has not been tried. The authors tried to evaluate the early stability using Periotst® value preliminarily.

Materials and Methods:

The patients who had been operated from Jun 2003 to May 2004 in the Seoul National University Bundang Hospital, Chosun University Dental Hospital, Bundang Jesaeng General Hospital respectively were included. To evaluate factors associated with early stability, patients were classified according to gender, age, area of surgery, bone quality, width of alveolar ridge, type of implant, diameter and length of implant. Primary stability and secondary stability was measured by Periotest® device.

Results:

Periotest® value at the time of implant placement was -1.7 in one-stage group. This value was significantly higher than that of two-stage group(+1.5). Diameter of implant was closely related with primary stability(p= .001). Primary stability was fine(under the +3) in 73.1%(95/130) of implants and 96.2%(125/130) of implants showed fine secondary stability. There was significant difference between primary stability and secondary stability.

Conclusions:

From the analysis of preliminary data, satisfactory result was on the whole achieved. More reliable data for the additional radiographic and histomorphometric evaluation will be followed later from this multicentric prospective study.
Ultimately, this study will contribute to develop more adaptable and compatible to the Korean people specifically and to suggest a clinical evidences that many clinicians could select domestic implant system with confidence.

Table 1. Paired t-test: Primary stability vs. Secondary stability

	t	df	Sig. (2-tailed)
Primary stability - Secondary stability	5.989	129	.000

Table 2. The resuits of Pearson correlation test

		Primary stability	Secondary stability
Age	Pearson Correlation	.162	130
	Sig.(2-tailed)	.066	.120
	N	.173	130
Width of alveolar ridge	Pearson Correlation	-.063	-.226**
	Sig.(2-tailed)	.473	.010
	N	130	130
Fixture diameter	Pearson Correlation	-.261**	-.107
	Sig.(2-tailed)	.003	.227
	N	130	130
Fixture length	Pearson Correlation	.136	.004
	Sig.(2-tailed)	.124	.967
	N	130	130
Exposure of implant thread	Pearson Correlation	.317**	,037
	Sig.(2-tailed)	.000	.676
	N	130	130
Primary stability	Pearson Correlation	1	.276**
	Sig.(2-tailed)	,	.001
	N	130	130
Secondary stability	Pearson Correlation	.276**	1
	Sig.(2-tailed)	.001	.
	N	130	130

*. Correlation is signiticant at the 0.05 level (2-telled)
**. Correlation is signiticant at the 0.01 level (2-telled)

US System Clinical Study

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

Background:

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

Methods:

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

Results:

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

Conclusions:

Bone healing between an implant and marginal bone was compromised at sites with a deeper defect when the width of the bone defect was 1.5 mm.

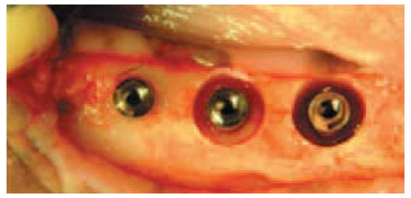
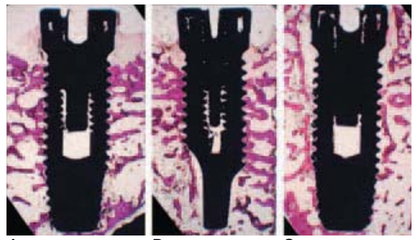
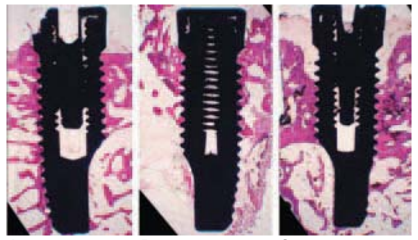


Fig. 1. Clinical photograph of control, T1, and T2.



A B C

Fig. 2. Longitudinal sections after 8 weeks of healing in control (A), T1 (B), and T2 (C), (original magnification × 10).



A B C

Fig. 3. Longitudinal sections after 12 weeks of healing in control (A), T1 (B), and T2 (C), (original magnification × 10).

Table 1. BIC (%; mean ± SD) in the coronal 5 mm of the implant

	Control	Ti (2.5 mm)	T2 (5.0 mm)
8 weeks	47.7 ± 14.7	43.6 ± 19.0	22.2 ± 14.7
12 weeks	56.7 ± 17.0	58.8 ± 12.0	35.1 ± 8.0

Table 2. Distance (mm; mean ± SD) from the implant margin to the most coronal level of contact between bone and implant

	Control	Ti (2.5 mm)	T2 (5.0 mm)
8 weeks	0.75 ± 0.26	1.20 ± 0.59	1.98 ± 1.45
12 weeks	0.59 ± 0.36	0.36 ± 0.40	2.52 ± 1.06

Table 3. Implant stability quotient values (mean ± SD)

	Control	Ti (2.5 mm)	T2 (5.0 mm)
Insertion	72.8 ± 5.2	65.0 ± 9.2	55.3 ± 9.0
8 weeks	79.7 ± 9.2	79.3 ± 2.5	78.1 ± 9.6
12 weeks	74.8 ± 9.0	78.0 ± 6.3	72.0 ± 6.6

Histologic and Histomorphometric Evaluation of Early and Immediately Loaded Implants in the Dog Mandible

New bone formation around US III Osstem implants after early and immediate loading was evaluated in this study. Three premolars and the first and second molars were first removed from the left mandible of five dogs. At 3 weeks after extraction of the teeth in the left mandible, the corresponding teeth in the right mandibles were removed. After 12 weeks of bone healing, five implants were placed in the left mandible. At 3 weeks after placement of implants in the left mandible, another five were placed in the right mandible. At the time of placing implants in the right mandible, four implants on each side were restored using a fixed provisional restoration. The anterior-most implant was not loaded and was used as controls. Periotest measurements performed immediately after implantation and after 16 weeks loading indicated implant stability for all groups tested. At 16 weeks after loading, the rate of periimplant bone formation for the early loaded, immediately loaded (IL), and control implants were observed to be 75.00, 73.37, and 62.04%, respectively. It was thus concluded that early stability was achieved in early and IL implants using fixed provisional restoration, thereby resulting in the high rate of peri-implant bone formation.

Table 1. Average periotest measurements on different implant groups post-operatively and at 16 weeks after loading

	n	Failure	Post-operation	At 16 weeks
Nonloaded group	10	0	- 3.1	- 3.6
Early loaded group	20	0	- 3.8	- 3.4
Immediately loaded group	20	0	- 3.6	- 3.1

Table 2. Distance from the top of the implant to the first observed DIB on different implant groups at 16 weeks after loading

	Nonloaded group	Early loaded group	Immediately loaded group
DIB (mm)	1.23 ± 0.98	0.79 ± 0.61*	1.65 ± 1.16*

*There two values differ significantly from each other ($p < .05$, ANOVA).

Table 3. NBFR (New bone formation rate) on different implant groups at 16 weeks after loading

	Nonloaded group	Early loaded group	Immediately loaded group
NBFR (%)	62.04 ± 15.67	75.00 ± 11.25*	73.47 ± 12.82*

*Significantly different from the Nonloaded group ($p < .05$, ANOVA).

US System Pre-Clinical Study

The Effect of Surface Treatment of the Cervical Area of Implant on Bone Regeneration in Mini-pig

Objective:

The present study was performed to evaluate the effect of surface treatment of the cervical area of implant on bone regeneration in fresh extraction socket following implant installation.

Materials and Methods:

The four minipigs, 18 months old and 30 kg weighted, were used. Four premolars of the left side of both the mandible and maxilla were extracted. ø3.3 mm and 11.5 mm long US II plus implants (Osstem Implant, Korea) with resorbable blasting media (RBM) treated surface and US II implants (Osstem Implant, Korea) with machined surface at the top and RBM surface at lower portion were installed in the socket. Stability of the implant was measured with Osstell™ (Model 6 Resonance Frequency Analyser: Integration Diagnostics Ltd., Sweden). After 2 months of healing, the procedures and measurement of implant stability were repeated in the right side by same method of left side. At four months after first experiment, the animals were sacrificed after measurement of stability of all implants, and biopsies were obtained.

Results:

Well healed soft tissue and no mobility of the implants were observed in both groups. Histologically satisfactory osseointegration of implants was observed with RBM surface, and no foreign body reaction as well as inflammatory infiltration around implant were found. Furthermore, substantial bone formation and high degree of osseointegration were exhibited at the marginal defects around the cervical area of US II plus implants. However, healing of US II implants was characterized by the incomplete bone substitution and the presence of the connective tissue zone between the implant and newly formed bone. The distance between the implant platform (P) and the most coronal level of bone-to-implant contact (B) after 2 months of healing was 2.66 ± 0.11 mm at US II implants group and 1.80 ± 0.13 mm at US II plus implant group. The P-B distance after 4 months of healing was 2.29 ± 0.13 mm at US II implants group and 1.25 ± 0.10 mm at US II plus implants group. The difference between both groups regarding the length of P-B distance was statistically significant ($p < .05$). Concerning the resonance frequency analysis (RFA) value, the stability of US II plus implants group showed relatively higher RFA value than US II implants group.

Conclusions:

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

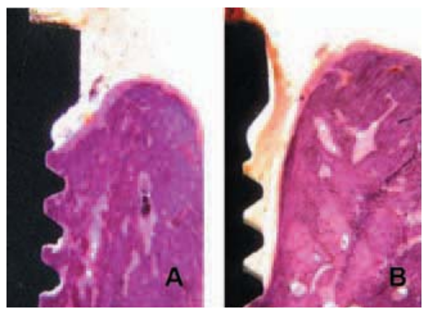


Fig. 1. The ground sections illustrate the result of healing.
A, The defect adjacent to coronal portion of US II plus implants is filled with newly formed bone.
B, The defect adjacent to coronal portion of US II implants is separated from the implant surface by a connective tissue.

Heat Transfer to the Implant-Bone Interface during preparation of Zirconia/Alumina Complex Abutment

Purpose:

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

Material & Methods:

Sixty zirconia/alumina complex abutments (ZioCera®, OSSTEM, Seoul, Korea) were randomized into 12 experiment groups. The abutments were connected to implant(US II, OSSTEM, Seoul, Korea) and embedded in an acrylic resin block in a 37℃ water bath. The abutments were reduced by 1mm in height over a period of 1 minute with high-speed handpiece and then polished for 30 seconds with low-speed handpiece both with and without air/water coolant. Temperatures were recorded via thermocouples at the cervical, middle, and apical part of the implant surfaces. The Mann-Whitney rank-sum test was used to assess the statistical significance of the difference in temperature between with the abutment/implant complexes altered with and without coolant.

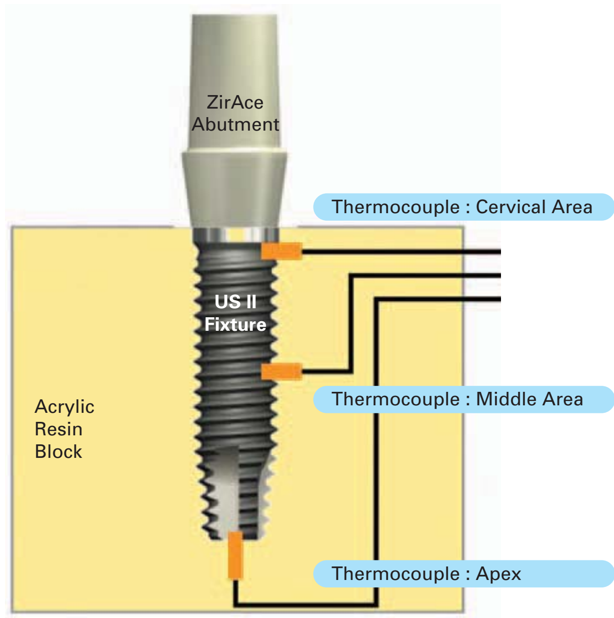


Fig 1. Schematic of locations of three temperature sensors.

Results :

The 1 mm reduction with high-speed 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 high-speed handpiece without coolant. Temperature difference between "with coolant" and "without coolant" during both low-speed polishing and high-speed reduction was statistically significant at the cervix of implant (p=.009). In contrast, temperature difference between "with coolant" and "without coolant" during both low-speed polishing and high-speed reduction was not statistically significant at the middle and apical part of implant ($p > .05$).

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.

Table 1. 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	.009
	No	40.02±0.83	
Middle	Yes	37.24±0.43	.754
	No	37.36±0.42	
Apical	Yes	37.09±0.46	.834
	No	37.27±0.31	

Table 2. 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	.009
	No	39.04±0.71	
Middle	Yes	37.23±0.33	.245
	No	37.43±0.33	
Apical	Yes	37.22±0.33	.465
	No	37.30±0.38	

US System References

Clinical Study

1. Young-Kyun Kim, Pil-Young Yun, Su-Gwan Kim, Bum-Soo Kim, Joo L Ong. Evaluation of Sinus Bone Resorption and Marginal Bone Loss after Sinus Bone Grafting and Implant Placement. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2009;107:e21-8.

2. Bum-Soo Kim, Young-Kyun Kim, Pil-Young Yun, Yang-Jin Yi, Hyo-Jeong Lee, Su-Gwan Kim, Jun-Sik Son. Evaluation of Peri-implant Tissue Response according to the Presence of Keratinized Mucosa. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2009;107:e24-8 .

3. Young-Dai Song, Sang-Ho Jun, Jong-Jin Kwon. Correlation Between Bone Quality Evaluated by Cone-Beam Computerized Tomography and Implant Primary Stability. Int J Oral Maxillofac Implants 2009;24(1):59-64.

4. Mi-A Kwon, Yong-Deok Kim, Chang-Mo Jeong, Ju-Youn Lee. Clinical and Radiographic Evaluation of Implants with Dual-microthread: 1-year Study. J Korean Acad Periodontol 2009;39(1):27-36.

5. Jang-Ho Son, Byung-hwan Choi, Soo-Won Park, Yeong-Cheol Cho, Iel-Yong Sung, Ji-Ho Lee, Ki-Jung Byun. Bone Density and Histomorphometry Assessment of Dental Implant Using Computerized Tomography. J Korean Assoc Maxillofac Plast Reconstr Surg 2009;31(2):137-46.

6. Hyun-Joo Kim, Woon-Jung Noh, Seung-Il Song, Sok-Min Ko. Implant Replacement Utilizing Zirconia Abutment in Esthetic Zone. J Korean Implantology(KAOMI) 2009;13(2):16-24.

7. Seong-Yeon Lee, Young-Kyun Kim, Pil-Young Yun, Yang-jin Yi, In-Sung Yeo, Hyo-Jung Lee, Ji-Young Lee. Prospective Clinical Study of Short Implant. Scientific Poster, 4th Congress of the ICOI Korea 2009.

8. Moo-Gyung Sung. User Guide of Osstem Implant Systems. Scientific Oral, The 50th Anniversary of KAP, International Prosthodontic Congress & The 6th Biennial Meeting of Asian Academy of Prosthodontics (AAP) 2009.

9. Sung-Moon Back, Min-Suk Oh, Su-Kwan Kim. A Retrospective Study on the Clinical Success Rate of Osstem Implant. Key Engineering Materials 2008;361-3:1331-4

10. Hong-Ju Park, Min-Suk Kook, Su-Gwan Kim, Young-Kyun Kim, Yong-Seok Cho, Gab-Lim Choi, Young-Hak Oh, Hee-Kyun Oh. Multicenter Retrospective Study of Immediate Two Different RBM Surfaced Implant Systems after Extraction. J Korean Assoc Maxillofac Plast Reconstr Surg 2008;30(3):258-65.

11. Min-Suk Kook, Hong-Ju Park, Su-Gwan Kim, Young-Kyun Kim, Yong-Seok Cho, Gab-Lim Choi, Young-Hak Oh, Hee-Kyun Oh. A Retrospective Multicenter Clinical Study of Installed US II / SS II Implants after Maxillary Sinus Floor Elevation. J Kor Oral Maxillofac Surg 2008;34:341-9.

12. Young-Kyun Kim, Pil-Young Yun, Jae-Hyung Im. Clinical Retrospective Study of Sinus Bone Graft and Implant Placement. J Korean Assoc Maxillofac Plast Reconstr Surg 2008;30(3):294-302.

13. Se-Il Ki, Min-Gi Yu, Young-Joon Kim, Min-Suk Kook, Hong-Ju Park, Uttom Kumar Shet, Hee-Kyun Oh. A Retrospective Evaluation of Implant Installation with Maxillary Sinus Augmentation by Lateral Window Technique. J Korean Assoc Maxillofac Plast Reconstr Surg 2008;30(5):457-64.

14. Young-Kyun Kim, Pil-Young Yun, Min-Jung Kwon. Short term Retrospective Clinical Study on GS II, SS III, US III. J Korean Implantology(KAOMI) 2008;12(2):12-22.

15. Kang-Woo Kim, Jae-Kwan Lee, Heung-Sik Um, Beom-Seok Chang. Soft-tissue Management for Primary Closure in Immediate Implant Placement. J Korean Acad Periodontol 2008;38(2):253-62 .

16. Bum-Soo Kim, Young-Kyun Kim, Pil-Young Yun, Yang-Jin Lee. Clinical Evaluation of Sinus Bone Graft Using Allograft and Xenograft. Scientific Poster, 17th Annual Scientific Congress of EAO 2008.

17. Seo-Yoon Kim, Su-Gwan Kim, Hak-Kyun Kim. A Comparision between the Survival Rate of RBM surface implants and Acid-etched surface implants : A prospective 1-year Clinical Study. Scientific Poster, J Kor Oral Maxillofac Surg 2008; 34 (Suppl).

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

19. Su-Gwan Kim, Chul-Min Park, Young-Kyun Kim, Hee-Kyun Oh, Gab-Lim Choi, Young-Hak Oh. Multicenter Retrospective Clinical Study of Osstem US II Implant System in Type IV Bone. J Korean Implantology(KAOMI) 2007;11(3):22-9.

20. Su-Gwan Kim, Min-Suk Oh, Young-Kyun Kim, Hee-Kyun Oh, Gab-Lim Choi, Young-Hak Oh.Multicenter Retrospective Clinical Study of Osstem US II Implant System in Complete Edentulous Patients.J Korean Implantology(KAOMI) 2007;11(3):12-21.

21. Young-Kyun Kim. Inferior Alveolar Nerve Repositioning and Implant Placement: Case Reports. J Korean Implantology(KAOMI) 2007;11(2):42-50.

22. Min-Seok Oh, Su-Gwan Kim, Hak-Kyun Kim, Seong-Yong Moon. Restoration of the Mandibular Overdenture Using Osstem Implants. Scientific Poster, 2nd Congress of the ICOI Korea 2007.

23. Seok-Min Ko, Jeong-Keun Lee, Steven E. Eckert, Yong-Geun Choi. Retrospective Multicenter Cohort Study of the Clinical Performance of 2-stage Implants in South Korean Populations. Int J Oral & Maxillofac Implants 2006;21(5):785-8.

24. Young-Kyun Kim, Pil-Young Yun, Dae-Il Son, Bum-Soo Kim, Jung-Won Hwang. Analysis of Clinical Application of Osstem (Korea) Implant System for 6 Years. J Korean Implantology(KAOMI) 2006;10(1):56-65.

25. Ju-Rim Sun, Su-Gwan Kim, Hee-Yeon Choi, Jong-Woon Kim, Ho-Bin Lee, Jung-Yeop Park,No-Seung Park, Sang-Yeol Kim, Su-Kwon Kim, Ki-Pyo No, Young-Hoon Won. US II Implantation Using SimPlant Software in a Maxillary Edentulous Patient; A Case Report. J Korean Implantology(KAOMI) 2006;10(3):28-37

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

27. Jin-Hwan Kim, Dong-Uk Jung. Vertical Ridge Augmentation and Implant Placement in Severe Bone Loss Area with Autogenous Bone and Bovine Bone. Scientific Poster, 1st Congress of the ICOI Korea 2006.

28. Young-Kyun Kim, Jung-Won Hwang, Pil-Young Yun, Su-Gwan Kim, Chae-Heon Chung, Yong-Gun Choi, Sung-Il Song. Multicentric Prospective Clinical Study of Korean Implant System: Early Stability Measured by Periotest. J Korean Dent Assoc 2004;42(12): 873-81.

29. Ki-Yoon Nam, Beon-Seok Chang, Heung-Sik Um. Retrospective Clinical Study of Domestic Dental Implant Success Rates. J Korean Acad Periodontol 2003;33(1):37-47.

30. Jai-Bong Lee, Young-Soo Wang, Kwang-Ho Shin, Byung-Nam Hwang. Retrospective Multicenter Study of Osstem Endosseous Dental Implant. J Korean Dent Assoc 2000;38(6): 558-66.

Pre-Clinical Study

Biology

1. Ji-Su Oh, Su-Gwan Kim, Sung-Chul Lim, Joo L. Ong. A Comparative Study of Two Noninvasive Techniques to Evaluate Implant Stability: Periotest and Osstell Mentor. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2009;107:513-8.

2. Hong-Cheol Yoon, Jung-Yoo Choi, Ui-Won Jung, Eun-Kyung Bae, Seong-Ho Choi, Kyoo-Sung Cho, Ho-Yong Lee, Chong-Kwan Kim, June-Sung Shim. Effects of Different Depths of Gap on Healing of Surgically Created Coronal Defects around Implants in Dogs: A Pilot Study. J Periodontol 2008;79(2):355-61.

3. Seong-Yong Moon, Su-Gwan Kim, Sung-Chul Lim, Joo L. Ong. Histologic and Histomorphometric Evaluation of Early and Immediately Loaded Implants in the Dog Mandible. J Biomed Mater Res 2008;86A:1122-7.

4. Jeong-Wan Ha, Su-Gwan Kim. Histomorphometric Analysis of an Immediate Non-functional Loaded Implant in Dogs. J Kor Oral Maxillofac Surg 2008;34:90-4.

5. Jin-Yong Cho, Young-Jun Kim, Min-Gi Yu, Min-Suk Kook, Hee-Kyun Oh, Hong-Ju Park. The Effect of Surface Treatment of the Cervical Area of Implant on Bone Regeneration in Mini-pig. J Kor Oral Maxillofac Surg 2008;34:285-92.

6. Soo-Young Bae, Su-Kyoung Kim, Eun-Jung Kang, Young-Bae An, Gyu-Sub Eom, Tae-Gwan Eom. The Effect of Hydroxyapatite-blasted Titanium Surface Roughness on Osteoblast-like Cell Line MG-63. Scientific Poster, Meeting of the Korean Society for Biomaterials 2008.

7. Jae-Wan Park, Min-Suk Kook, Hong-Ju Park, Uttom Kumar Shet, Choong-Ho Choi, Suk-Jin Hong, Hee-Kyun Oh. Comparative Study of Removal Effect on Artificial Plaque from RBM Treated Implant. J Korean Assoc Maxillofac Plast Reconstr Surg 2007;29(4):309-20.

8. Se-Hoon Kahm, Yong-Chul Bae, Sung-Eun Yang, Chang-Hyen Kim, Je-Uk Park. Histomorphometric Analysis of Different Type Immediate Loaded Implants in Human. Scientific Poster, 16th Annual Scientific Congress of EAO 2007.

9. Cheong-Hwan Shim, Yu-Jin Jee, Hyun-Chul Song. Expression of Osseointegration-related Genes around Titanium Implant: BMP2, BMP4. J Korean Assoc Maxillofac Plast Reconstr Surg 2005;27(4):307-14.

10. Who-Suk Hong, Tae-Hee Kim, Seong-Hee Ryu, Min-Suk Kook, Hong-Ju Park, Hee-Kyun Oh. Comparative Study of Osseointegration of 4 Different Surfaced Implants in the Tibia of Dogs. J Kor Oral Maxillofac Surg 2005;31:46-54.

11. Su-Gwan Kim, Cheung-Yeoul Park, Sun-Sik Park, Myung-Duck Kim, Tae-Gwan Eom. Surface Properties of Endosseous Dental Implants after Nd;YAG and CO_2 Laser Treatment at Various Energies. Scientific Poster, The Academy of AO 2005.

12. Jae-Woo Kwak, Tae-Hee Kim, Hong-Ju Park, Hee-Kyun Oh. Effect of Implant Surface Characteristics on Osseointegration in the Ilium of Dogs. J Korean Assoc Maxillofac Plast Reconstr Surg 2004;36(6):531-41.

13. Tae-Il Kim, Tae-Gwan Eom, Tae-Hee Byun, Kyu-Ok Choi, Jae-Ho Kim. Elemental Analysis of the Surface Residues on Dental Implants. Biomaterials Research 2003;(7)4:254-9.

Pre-Clinical Study

Biomechanics

1. Jung-Bo Huh, Steven E. Eckert, Seok-Min Ko, Yong-Geun Choi. Heat Transfer to the Implant-Bone Interface during preparation of Zirconia/Alumina Complex Abutment. Int J Oral Maxillofac Implants 2009;24(4):679-83.

2. Ju-Hee Park, Young-Jun Lim, Myung-Joo Kim, Ho-Beom Kwon. The effect of various thread designs on the initial stability of taper implants. J Adv. Prosthodont 2009;1:19-25.

3. Tae-Gwan Eom, Seung-Woo Suh, Gyeo-Rok Jeon, Jung-Wook Shin, Chang-Mo Jeong. Effect of Tightening Torque on Abutment-Fixture Joint Stability using 3-Dimensional Finite Element Analysis. J Kor Acad Prosthodont 2009;47(2):125-35.

4. Myung-Seok Kim, Seong-Joo Heo, Jai-Young Koak, Sung-Kyun Kim. Strains of Abutment and Bones on Implant Overdentures. J Kor Acad Prosthodont 2009;47(2):222-31.

5. Mi-Soon Lee, Kyu-Won Suh, Jae-Jun Ryu. Screw Joint Stability under Cyclic Loading of Zirconia Implant Abutments. J Kor Acad Prosthodont 2009;47(2):164-73.

6. Il-Song Park, Sang-Yong Won, Tae-Sung Bae, Kwang-Yeob Song, Charn-Woon Park, Tae-Gwan Eom, Chang-Mo Jeong. Fatigue Characteristics of Five Types of Implant-Abutment Joint Designs. METAL AND MATERIALS International 2008;14(2):133-8.

7. Hyon-Mo Shin, Chang-Mo Jeong, Young-Chan Jeon, Mi-Jeong Yun, Ji-Hoon Yoon. Influence of Tightening Torque on Implant-Abutment Screw Joint Stability. J Kor Acad Prosthodont 2008;46(4):396-408.

8. Jae-Kyoung Park, Chang-Mo Jeong, Young-Chan Jeon, Ji-Hoon Yoon. Influence of Tungsten Carbide/Carbon Coating of Implant-Abutment Screw on Screw Loosening. J Kor Acad Prosthodont 2008;46(2):137-47.

9. Tae-Sik Lee, Jung-Suk Han, Jae-Ho Yang, Jae-Bong Lee, Sung-Hun Kim. The Assessment of Abutment Screw Stability Between the External and Internal Hexagonal Joint under Cyclic Loading. J Kor Acad Prosthodont 2008;46(6):561-8.

10. Jung-Bo Huh, Sok-Min Ko. The Comparative Study of Thermal Inductive Effect Between Internal Connection and External Connection Implant in Abutment Preparation. J Kor Acad Prosthodont 2007;45(1):60-70.

11. Dae-Woong Kang, Sang-Wan Shin, Hyun Jung Jo, Sung-Hun Kim. The Effect of Various Designs of Dental Implant Fixtures on Their Initial Stability. J Korean Implantology(KAOMI) 2007;11(2).

12. Gap-Yong Oh, Sung-Hwa Park, Seok-Gyu Kim. Influence of Implant Fixture Design on Implant Primary Stability. J Kor Acad Prosthodont 2006;45(1):98-106.

13. In-Ho Kang, Myung-Joo Kim, Young-Jun Lim, Chang-Whe Kim. The Effect of Autoclave Sterilization and Reuse of Smartpeg™, on the Implant Stability Quotient (ISQ) Measurement. J Kor Acad Prosthodont 2007;45(5):644-52.

14. Si-Yeob Kim, Byung-kook Kim, Jin-Ho Heo, Ju-Youn Lee, Chang-Mo Jeong, Yong-Deok Kim. Evaluation of Stability of Double Threaded Implant-Emphasis on Initial Stability Using Osstell Mentor™; Part I. J Kor Acad Stomatog Func Occlusion 2007;23(4).

15. Tae-Sik Lee, Jung-Suk Han, Jae-Ho Yang, Jae-Bong Lee, Sung-Hun Kim. An Influence of Abutment Materials on a Screw-Loosening after Cyclic Loading. J Kor Acad Prosthodont 2007;45(2):240-249.

16. Ahran Pae, Kyung-A Jeon, Myung-Rae Kim, Sung-Hun Kim. Comparative Study on The Fracture Strength of Metal-Ceramic Versus Composite Resin-Veneered Metal Crowns in Cement-Retained Implant-Supported Crowns under Vertical Compressive Load. J Kor Acad Prosthodont 2007;45(3):295-302.

17. Sok-Min Ko. The Accuracy of Impression Technique using the New Impression Coping. Scientific Oral, 12th International College of Prosthodontists Meeting.

18. Chae-Heon Chung. Detorque Force of TiN-coating Abutment Screw with Various Coating Thickness After Repeated Closing and Opening. Scientific Oral, 12th International College of Prosthodontists Meeting.

19. Min-Gun Kim, Ji-Hun Lee, Dong-Yeol Kim. Simulation of Corrosion Fatigue Life on the Dental Implant. Scientific Oral, Kor Society of Mechanical Engineers Conference, 2007.

20. Jin-Uk Choi, Chang-Mo Jeong, Young-Chan Jeon, Jang-Seop Lim, Hee-Chan Jeong, Tae-Gwan Eom. Influence of Tungsten Carbide/Carbon on the Preload of Implant Abutment Screws. J Kor Acad Prosthodont 2006;44(2):229-42.

21. Ki-Duk Park, Sang-Un Han, Hong-Seo Yang, Ju-Seok Kim. Three-Dimensional Finite Analysis of Functional Stresses in Varied Width of Crestal Bone, Implant Diameter and Buccal off Position. Scientific Poster, 15th EAO conference, 2006.

22. Yong-Suk Cho, Chul-Hyun Jeong , Tae-Soo Kim, Dong-Hoon Jang, Tae-Gwan Eom. Temperature Measurement During Implant-Site Preparation. Scientific Poster, 15th EAO conference, 2006.

23. Ji-Hoon Yoon, Sung-Geun Lee, Chang-Mo Jeong, Tae-Gwan Eom. The Study of Dynamic Behaviour about Implant System with WC/C Coating. Scientific Poster, 15th EAO conference, 2006.

24. Chun-Yeo Ha, Chang-whe Kim, Young-Jun Lim, Kyung-Soo Jang. The Effect of Internal Implant-Abutment Connection and Diameter on Screw Loosening. J Kor Acad Prosthodont 2005;43(3):379-92.

25. Jung Bo Huh, Sok Min Ko. Heat Transfer to the Implant Bone interface During Setting of Autopolymerizing Acrylic Resin Applied to Impression Copings for Implant Impression. J Korean Implantology(KAOMI) 2005;9(2):44-9.

26. Kwang-Hoon Kim, Chang-Mo Jeong, Ji-Hoon Yoon, Ji-Yun Seong. Effect of Implant-Abutment Joint Design on Dynamic Fatigue Strength. Scientific Poster, 20th AO Conference, 2005.

27. Tae-Gwan Eom, Chang-Mo Jeong, Kwang-Hoon Kim. The Effect of Tightening Torque on Reliability of Joint Stability. Scientific Poster, 14th EAO conference, 2005.

28. Ji-Hoon Yoon, Chang-Mo Jeong, Tae-Gwan Eom, Mi-Hyun Cheon. Effect Joint Design on Static and Dynamic Strength. Scientific Poster, 14th EAO conference, 2005.

29. Tae-Hee Byun, Kwang-Hoon Kim. Study on the Adaptation to the Investment Water-Powder Ratio by the Abutment and Casting Crown. Scientific Poster, Kor Dent Technician Associate 2005 Conference.

30. Byung-Gi Cho, Jae-Ho Ryu. Study of Possibility Direct Casting on Titanium Abutment. Scientific Poster, Kor Dent Technician Associate 2005 Conference.

31. Byung-Soo Bae, Jae-Ho Ryu. Investigation of the Resin Adhesion and Task Convenience for Surface Shape. Scientific Poster, Kor Dent Technician Associate 2005 Conference.

32. Su-Gwan Kim, T.H. Kang, Kyu-Ok Choi, Tae-Hee Byun, Tae-Gwan Eom, Myung-Duk Kim. Finite Element Stress Analysis according to Apical-Coronal Implant Position. Scientific Poster, 19th AO Conference, 2004.

33. June-seok Lee,Yung-Soo Kim, Chang-Whe Kim, Jung-Suk Han. Wave Analysis of Implant Screw Loosening using an Air Cylindrical Cyclic Loading Device. J Prosthet Dent 2002;88:402-8.

34. Yong-Tae Jeong, Chae-Heon Chung, Heung-Tae Lee. Screw Joint Stability according to Abutment Screw Materials. J Kor Acad Prosthodont 2001;39(3):297-305.

35. Soel-Hee Choi, Young-Chan Jeon, Hee-Sung Hwang, Chang-Mo Jeong. Effect of Thin-gold Coating on the Preload and Removal Torque of Implant Prosthetic Retaining Screw. J Korean Res Soc Dent Mater 2000;27(2):117-27.

36. Jae-Bong Lee. Preliminary Study on the Design of Screw Head for Rapid Fastening & Loosening. J Kor Acad Family Medicine 2000;2(2):26-31.

37. Jae-Bong Lee. The Retrievability of Cementation Type Implant Abutment by Surface Treatments and Types of Cements. J Kor Acad Prosthodont 1999;37(5):651-57.

38. Jae-Bong Lee, Byung-Nam Hwang, Seung-Hyun Yoo, Chul-Jin Byun, Seok-Kyu Choi. The Comparative Study of Mechnical Stability Between Self Tapping Fixture and Double Threaded Fixture by 3-dimensional Finite Element Analysis. J Kor Acad of General Dentistry 1999;1(1):73-81.

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

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