The Use of Implantoplasty and Guided Bone Regeneration in the Treatment of Peri-implantitis: Two Case Reports

Jong-Jin Suh, MSD, PhD,* Ziv Simon, DMD, MSc,† Young-Sik Jeon, MSD, PhD,‡ Byeong-Gap Choi, MSD, PhD.§ Chong-Kwan Kim, MSD, PhD||

peri-implant disease (“peri-implantitis”) manifests as a microbial plaque-induced inflammatory process,¹–⁵ which could be preceded by occlusal overload affecting the soft tissues and bone around osseointegrated dental implants. Left untreated, this condition will in most instances lead to progressive bone loss, implant loss, and the need for revisional treatment. However, reports of effective and predictable interventional methods of treatment for peri-implantitis are few. The rationale in current treatment approaches to peri-implantitis largely has been derived from established periodontal treatment modalities. It is generally thought that similarities in pathogenesis do exist between peri-implant disease and periodontitis because there are similar microbiota involved.⁷–⁹ There is a correlation between the presence of plaque and peri-implant disease,¹⁰ and with long-term implant success¹¹ and, on occasion, favorable responses to antimicrobials.¹² Although both surgical and nonsurgical approaches have been proposed, convincing data is lacking and the treatment of peri-implantitis remains empiric.¹³

To be effective, early intervention is advisable to prevent significant bone loss, whether horizontal, vertical, or both. Guided bone regeneration with the use of membranes and various graft materials has been reported to be effective,¹⁴–²⁰ although no randomized and properly controlled studies have been published to date. The application of guided bone regeneration to the management of peri-implantitis usually involves implant surface debridement and detoxification, placement of a bone graft covered with a membrane, and resumption of the implant during the healing interval. Clinicians have suggested different detoxification agents such as tetracycline,¹⁵,¹⁶,²¹ citric acid,¹⁵,²²–²⁴ chlorhexidine gluconate,²⁵ and hydrogen peroxide. However, direct comparison to establish whether any of these agents is superior to the others in removing plaque organisms and their biofilms has not been done, and, again, their use is strictly empiric. A key consideration in this detoxification step is that roughened or “textured” implant surfaces, now commonly used for more challenging treatment scenarios (such as bone of low density), are more retentive to bacterial plaque if they become exposed to the oral cavity and, therefore, more difficult to detoxify. Alternative nonchemical methods of implant surface decontamination also have been suggested. The use of lasers,²⁶–²⁹ air abrasion,³⁰ or removal of the affected implant surface region have been described as being effective in this context. The last approach, ie, removal of the affected surface region, has been termed “implantoplasty” (or “fixture modification”) and is aimed at modifying the implant’s surface using rotary instruments.³¹ With textured implant surfaces, this approach renders the affected implant surface less plaque-retentive in the hopes of arresting progressive crestal bone loss. Im-

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plantoplasty in conjunction with guided bone regeneration was used in the treatment of peri-implantitis in the present series of 2 case reports.

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Case No. 1

A 45-year-old healthy man with a noncontributory medical history was referred to Yonsei University Dental Hospital from a private practice. Two ITI (Straumann, Switzerland) solid screw implants (12-mm length × 4.1-mm diameter) had been placed 2 months earlier to replace teeth nos. 19 and 21 (lower left first premolar and molar) using the recommended single-stage surgery placement technique. The patient presented with a buccal swelling associated with the no. 21 implant and clinical examination revealed pus discharge from the associated gingival crevice (Fig. 1). Radiographically, a radiolucent lesion was noticed around the implant at the no. 21 site, but there was no detectable implant mobility (Fig. 2). At this time, the patient was prescribed Amoxicillin (500 mg 3 times a day for 1 week), and the site was irrigated with chlorhexidine gluconate (0.12%). One week later, a full-thickness mucoperiosteal flap was elevated around the affected implant, and advanced bone loss was seen largely limited to the buccal aspect (Fig. 3). The defect extended to the third thread. The defect area was debrided using hand instruments, including the removal of all granulation tissue. The affected textured implant surface was modified in an attempt to reduce its roughness using a high-speed handpiece and diamond burr under copious irrigation. A tetracycline solution (the contents of 1 250-mg capsule mixed with 5 mL saline) was applied to the modified implant surface for 5 minutes using cotton pellets (Fig. 4). Next, the cortical bone on the internal and external aspects of the defect was perforated to encourage bleeding using a round burr. Autogenous bone was harvested from the retromolar area of tooth no. 17 (lower left third molar) and particulated using hand instruments. Thereafter, the defect was filled with this autogenous bone graft material and the graft site covered with a membrane (Gore-Tex® ePTFE; Gore, Newark, DE; Fig. 5). The flap was then repositioned using Gore-Tex sutures with complete membrane coverage (Fig. 6). The patient continued on the same Amoxicillin regimen (500 mg 3 times a day for 1 week) starting 1 day preoperatively. In addition, the patient was asked to rinse with chlorhexidine gluconate (0.12%) twice daily for 30 seconds starting 1 day postoperatively and for the first 2 weeks postoperatively. A similar surgical approach as case no. 1 was applied. This included full-thickness flap elevation, defect debridement, decontamination with tetracycline (Figs. 10 and 11), and implantoplasty using a

Case No. 2

A 33-year-old woman with a noncontributory medical history was referred to Yonsei University Dental Hospital from a private practice. Two ITI (Straumann) hollow cylinder-type implants (12 mm × 4.1 mm) had been placed 30 months earlier to replace teeth nos. 30 and 31 (lower right first and second molars) and had been in function for 2 years. The patient reported mild discomfort and presented with a slight buccal swelling and pus discharge from the gingival crevice of the implant at the no. 30 site (Fig. 9). She was prescribed Amoxicillin (500 mg 3 times a day for 1 week) starting 1 day preoperatively. A similar surgical approach as case no. 1 was applied. This included full-thickness flap elevation, defect debridement, decontamination with tetracycline (Figs. 10 and 11), and implantoplasty using a

plantoplasty in conjunction with guided bone regeneration.
flame-shaped diamond burr. Bone was harvested from the surgical site (distal to the implant at the no. 30 site), and was placed in the defect and covered with a Gore-Tex membrane as before. The site was left to heal for 6 months after which the membrane was removed. At this time, almost complete bone fill was observed both clinically and radiographically (Figs. 12, 13, and 14). The original prosthesis was replaced on the rescued implants 1 month later.

**DISCUSSION**

Microbial infection of an implant’s surface could lead to the unfavorable result of implant loss and the need for retreatment. The case reports presented here demonstrated an early and late infection after implant placement (2 months and 2.5 years respectively). The time of the initial infection is not consistent, and therefore it is important to monitor restored implants for several years. Single-stage implants are as successful as two-stage implants; thus, both approaches harbor the risk for infection at any time. To minimize the risk of peri-implantitis, it is recommended to adhere to strict sterile surgical techniques as well as meticulous oral hygiene by the patient. Once a peri-implant inflammatory process has been detected, it is crucial to treat the infected area as soon as possible. Assuming absence of implant mobility and localized peri-implant bone destruction, a variety of treatment modalities have been proposed for the management of peri-implantitis. These are mostly based on empiric experience and use the systemic administration of an antibiotic in conjunction with surgical intervention. To ensure decontamination of the affected implant surface(s), chemical and/or mechanical debridement is used. No detoxifying agent has been shown to be superior over others. The clinician can use one of the agents suggested in the literature in an empiric manner. For textured implant surfaces, detoxification using implantoplasty can also provide favorable results when used as part of the procedure. A graft material of choice can be used to replace the lost bone. It is the author’s opinion that whenever possible, autogenous bone should be used, because it is still considered to be the “gold standard” for grafting procedures. The use of a membrane is intended to contain the graft material and exclude epithelial cells from the guided bone-regeneration site. Optimally, a membrane should be present for the entire duration of the healing process; therefore, use of a nonresorbable membrane is advantageous and ensures its retention. After an implant repair procedure, a healing period should be allowed without loading. No specific healing period has been suggested in the literature; however, it is the author’s opinion that this healing period should be no less than the number of months allowed for healing after the implant initial placement. Successful repair of an ailing implant requires maximum attention to meticulous surface decontamination and creation of proper conditions for implant reintegration.

**SUMMARY**

In the 2 cases reported here in which ITI implants developed localized peri-implantitis lesions, implantoplasty of exposed SLA (sandblasted, large-grit, acid-etched) and TPS (titanium plasma spray) surfaces followed by topical tetracycline decontamination were used in conjunction with guided bone regeneration with autogenous bone and ePTFE membranes, along with removal of implant loading in the second case. In both cases, the procedure was effective in arresting disease and regenerating lost bone, and these results suggest that the technique holds promise and should be investigated further.

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**Fig. 9.** Buccal swelling and pus discharge at the no. 30 implant site.
**Fig. 10.** Advanced bone loss around the no. 30 implant after flap reflection.
**Fig. 11.** Radiographic bone loss around the no. 30 implant.
**Fig. 12.** Bone regeneration around the no. 30 implant after 6 months.

**Fig. 13.** Radiograph indicating bone regeneration around the no. 30 implant.
**Fig. 14.** Original prosthesis replaced on the rescued implants.
Disclosures

The authors claim to have no financial interest in any company or product mentioned in this article.

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Reprint requests and correspondence to:
Jong-Jin Suh, DDS, MSD
Yonsei University
College of Dentistry
Department of Periodontics
Shinchondong, Sudaemoongu
Seoul, Korea
Phone: (82)-2–3453–2520
Fax: (82)-2–3453–2343
E-mail: dreamsij@hananet.net
Behandlung von Peri-Implantitis durch die Verwendung von Implantoplastiken und durch gezielte Knochensubstitution: zwei Fallstudien


SCHLÜSSELRÖTTER: Infektion des Implantats, Oberflächenveränderung, Implantatversagen, Mundbakterien

El uso de implantastralia y la regeneración guiada del hueso en el tratamiento de la periimplantitis–dos informes de caso

ABSTRACTO: Una variedad de modalidades de tratamiento se han propuesto para la atención de la periimplantitis. Los mismos se basan principalmente en la experiencia empírica y emplean la administración sistémica de un antibiótico junto con la intervención quirúrgica. Para asegurar la descontaminación de las superficies afectadas del implante se emplea el desbridamiento químico y/o mecánico. Para la desintoxicación de las superficies texturizadas del implante, el uso de la implantoplastia también podrá brindar resultados favorables cuando se usan como parte del procedimiento. Se informaron dos casos en los que los implantes crearon lesiones periimplantitis localizadas. La implantoplastia guiada de la des contaminación con tetraciclina tópica se usó junto con la regeneración guiada del hueso. En ambos casos, los procedimientos tuvieron efecto en la eliminación de la enfermedad y la regeneración del hueso perdido. Dichos resultados sugieren que la técnica es prometedora y deberá investigarse con mayor profundidad.

PALABRAS CLAVES: infección en el implante, modificación de la superficie, falla del implante, bacteria oral

* Professor Assistente de Clínica, Departamento de Periodontia, Faculdade de Odontologia da Universidade de Yonsei, Seul, Coréia. ** Residente, Divisão de Periodontia, Faculdade de Odontologia da Universidade de Toronto, Toronto, Canadá. *** Professor Assistente de Clínica, Departamento de Prostodontia, Faculdade de Odontologia da Universidade de Yonsei, Seul, Coréia. **** Professor Assistente, Departamento de Prostodontia, Faculdade de Odontologia da Universidade de Yonsei, Seul, Coréia. ***** Professor, Departamento de Periodontia, Faculdade de Odontologia da Universidade de Yonsei, Seul, Coréia.

SUMÁRIO: Uma variedade de modalidades de tratamento tem sido propostas para o gerenciamento da peri-implantite. Estes são em sua maioria baseados em experiências empíricas e empregam a administração sistêmica de antibióticos em conjunto com intervenção cirúrgica. Para assegurar a descontaminação da superfície(s) afetada do implante, o desbridamento químico e/mecânico é utilizado. Para superfícies de implante texturizadas a desentoxicação usando implantoplastia pode também oferecer resultados favoráveis quando usada como parte do procedimento. Dois casos são relatados nos quais os implantes desenvolveram lesões localizadas de peri-implantite. A implantoplastia seguida por uma descontaminação tópica com tetraciclina foi usada em conjunto com a regeneração guiada do osso. Em ambos os casos, os procedimentos foram efetivos em deter a doença e regenerar o osso perdido. Estes resultados sugerem que a técnica é positiva e deveria ser investigada mais profundamente.

PALAVRAS-CHAVE: infecção de implante, modificação da superfície, falha de implante, bactérias orais.

O Uso da Implantoplastia e Regeneração Ossea Guiada no Tratamento de Peri-implantite—Dois Relatórios de Caso

Peri-implantitis治療のためのimplantoplastyとguided骨再生—症例報告2件

著者：ジョン・ジン・スフ、DDS、MSD*、ジブ・サイモン、DMD**、ヨン・シク・ジェオン、MSD、PhD***、ビョン・ギャブ・チョイ、MSD、PhD****、チョングバン・キム、MSD、PhD*****

要約：Peri-implantitis処置のために、これまで各種の治療モダリティが提案されてきている。これらの中は経験的療法で、抗生物質の全身投与と外科的介助を作らせるものであった。インプラント表面の汚染除去のためには化学的または外科的な組織除去が用いられるが、Textured（表面加工処理）されたインプラント表面の無消毒のために、implantoplastyを併用すると良い結果が得られる場合がある。本論文では、インプラントが4部のper-implantitis変性を形成した2件の症例が報告される。Implantoplastyに続くテトラサイクリンの局所投与による無消毒処置が、guided再生法に併用された。どちらの症例においても、これらの処置は病気進行の阻止と失われた骨の再生に有効であった。これらの結果は、この方法が将来性があることを示している。

キーワード：インプラント感染、表面のmodification、インプラント失敗、口腔内細菌

*ヨンセイ大学歯科・オブ・デンティストリー南陽病学部臨床助教授（ソウル、韓国）
**トロント大学歯学部歯周病学科レジデント（トロント、カナダ）
***ヨンセイ大学歯科・オブ・デンティストリー補綴歯科学部臨床助教授（ソウル、韓国）
****ヨンセイ大学歯科・オブ・デンティストリー歯周病学部教授（ソウル、韓国）
*****ヨンセイ大学歯科・オブ・デンティストリー歯周病学部教授（ソウル、韓国）

問い合わせ先：Dr. Jong-jin Suh, Yonsei University, College of Dentistry, Department of Periodontics, Shinchondong, Sudaemoongu, Seoul, Korea.
電話：(82)-2-3453-2520 ファックス：(82)-2-3453-2343 Eメール：dreamssj@hananet.net

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