Early loading (2 or 6 weeks) of sandblasted and acid-etched (SLA) ITI implants in the posterior mandible. A 1-year randomized controlled clinical trial.

Salvi GE, Gallini G, Lang NP.

Abstract

The aim of this 1-year prospective controlled clinical trial was to evaluate the effect of early loading of ITI solid screw titanium implants with a sandblasted and acid-etched (SLA) surface on clinical and radiographic parameters.

MATERIAL AND METHODS:

Twenty-seven consecutively admitted patients presenting bilateral edentulous posterior mandibular areas and in need of prosthetic reconstruction were recruited. Sixty-seven ITI standard solid screw implants with an SLA surface, a diameter of 4.1 mm and a length of 8, 10 or 12 mm were installed bilaterally in molar and premolar areas according to a one-stage surgical protocol. One week (test) and 5 weeks (control) after implant placement, solid ITI prosthetic abutments were connected using a torque of 35 N cm. No provisional restoration was fabricated. Two weeks (test) and 6 weeks (control) after implant placement, porcelain-fused-to-metal single-tooth crowns were cemented. Clinical measurements were obtained at day 0 and 2, 6, 12, 24 and 52 weeks thereafter. Periapical radiographs were taken immediately after implant placement, after 6 weeks and at the 1-year examination.

RESULTS:

After 1 year, implant survival was 100%. Two test and one control implants rotated at the time of abutment connection and were left unloaded for 12 additional weeks. At the 1-year examination, no statistically significant differences were found between the test and control sites with respect to pocket probing depths (2.6 mm +/- 0.5 vs. 2.7 mm +/- 0.5), mean clinical attachment levels (3.1 mm +/- 0.4 vs. 3.2 mm +/- 0.5), mean percentages of sites bleeding on probing (9.7% vs. 8.3%), mean widths of keratinized mucosa (1.8 mm +/- 0.4 vs. 1.9 mm +/- 0.5), mean PerioTest values (-1.4 PTV +/- 0.9 vs. -1.6 PTV +/- 0.8) or mean crestal bone loss measurements (0.57 mm +/- 0.49 vs. 0.72 mm +/- 0.50).

CONCLUSION:

Based on these results, loading of titanium implants with an SLA surface as early as 2 weeks did not appear to jeopardize the osseointegration healing process in the posterior mandible. Furthermore, implants rotating at 35 N cm, if left unloaded for additional 12 weeks, did not negatively affect clinical and radiographic outcomes.
Early loading of sandblasted and acid-etched (SLA) implants: a prospective split-mouth comparative study.

Roccuzzo M, Bunino M, Prioglio F, Bianchi SD.


Abstract

Sandblasted and acid-etched (SLA) implants were recently introduced to reduce the healing period between surgery and prosthesis. In this split-mouth study, SLA implants were compared to titanium plasma-sprayed (TPS) implants under loaded conditions one year after placement in 32 healthy patients, with comparable bilateral edentulous sites and no discrepancies in the opposing dentition. The surgical procedure was performed by the same operator and was identical at 68 SLA (test) and 68 TPS (control) sites. Tapping was never performed and primary stability was always achieved. Abutment connection was carried out at 35 Ncm 6 weeks postsurgery for test sites and 12 weeks for the controls, by the same dentist blind to the type of surface of the implant. In 4 of the 68 test sites the implant rotated slightly, patients reported minor pain and connection was not completed. Provisional restoration was fabricated and a new tightening was performed after six weeks. Similar gold-ceramic restorations were cemented on the same type of solid abutments on both sites. No implant was lost. Clinical measures and radiographic changes were recorded by the same operator, blind to the type of surface of the implant, 1 year post surgery. No significant differences were found with respect to presence of plaque (24% vs. 27%), bleeding on probing (24% vs. 31%), mean pocket depth (3.3 mm vs. 2.9 mm) or mean marginal bone loss (0.65 mm vs. 0.77 mm). The results suggest that SLA implants are suitable for early loading at 6 weeks. Limited implant spinning may occasionally be found but, if properly handled, it produces no detrimental effect on the clinical outcome.
Early loading of sandblasted and acid-etched implants: a randomized-controlled double-blind split-mouth study. Five-year results.

Roccuzzo M, Aglietta M, Bunino M, Bonino L.


Abstract

OBJECTIVES:

The aim of the present split-mouth study is to assess the peri-implant conditions around early-loaded sandblasted and acid-etched (SLA) implants, 5 years after abutment connection and to compare, in the same patients, the results obtained with a standard protocol using identical implants with a TPS surface.

MATERIAL AND METHODS:

Surgical procedure was performed by the same operator and was identical at test (SLA) and control (TPS) sites, in 32 healthy patients. Abutment connection was carried out at 35 N cm 6 weeks postsurgery for test sites and 12 weeks for the controls. Patients were seen regularly, for control and professional cleaning. At 60 months, clinical measures and radiographic bone changes were recorded by the same operator, blind to the type of surface of the implant, on 27 patients, as five patients were lost to follow-up.

RESULTS:

A total number of 106 implants were examined. No implant was lost. No significant differences were found with respect to the presence of plaque [modified plaque index (mPI) 0.27+/-0.56 vs. 0.32+/-0.54], bleeding on probing (29% vs. 32%), mean pocket depth (3.2+/-1 vs. 3.2+/-1 mm) or mean marginal bone loss (0.32+/-1.04 vs. 0.44+/-1.12 mm) between test and control. Four implants that presented 'spinning' at the time of abutment connection presented no significant differences from the rest of the test sites.

CONCLUSION:

The results of this prospective study confirm that SLA implants, under defined conditions, are suitable for early loading at 6 weeks in both the mandible and the maxilla. Limited implant spinning, occasionally found at abutment connection, produces no detrimental effect on the clinical outcome when properly handled.
The use of reduced healing times on ITI implants with a sandblasted and acid-etched (SLA) surface: early results from clinical trials on ITI SLA implants.


Abstract

ITI dental implants are available with two bone-anchoring surfaces, a titanium plasma-sprayed (TPS) surface, and a recently introduced sandblasted and acid-etched (SLA) surface. Cell culture and animal tests demonstrate that the SLA surface stimulates bone cell differentiation and protein production, has large amounts of bone-to-implant contact, and results in large removal torque values in functional testing of the bone contact. As a result of these studies, a prospective human clinical trial was initiated to determine whether the 4.1 mm diameter SLA ITI solid screw implants could be predictably and safely restored as early as six weeks after implant placement surgery. The protocol restricted the use of the reduced healing time to a) healthy patients with sufficient bone volume to surround the implant, and b) those patients who had good bone quality (classes I-III) at the implant recipient site. Patients with poorer bone quality (class IV) did not have restorations until 12 weeks after implant placement. The clinical trial is an ongoing multicenter trial, with six centers in four countries, and with follow-up over five years. The primary outcome variable was abutment placement with a 35 Ncm force, with no countertorque and no pain or rotation of the implant. A secondary outcome was implant success, as defined by no mobility, no persistent pain or infection, and no peri-implant radiolucency. To date, 110 patients with 326 implants have completed the one-year post-loading recall visit, while 47 patients with 138 implants have completed the two-year recall. Three implants were lost prior to abutment connection. Prosthetic restoration was commenced after shortened healing times on 307 implants. The success rate for these implants, as judged by abutment placement, was 99.3% (with an average healing time of 49 days). Life table analyses demonstrated an implant success rate of 99.1%, both for 329 implants at one year and for 138 implants at two years. In the 24-month period after restoration, no implant losses were reported for the 138 implants. These results demonstrate that, under defined conditions, solid screw ITI implants with an SLA endosseous surface can be restored after approximately six weeks of healing with a high predictability of success, defined by abutment placement at 35 Ncm without countertorque, and with subsequent implant success rates of greater than 99% two years after restoration.

Clinical field trial examining an implant with a sand-blasted, acid-etched surface.

Cochran D, Oates T, Morton D, Jones A, Buser D, Peters F.


Abstract

BACKGROUND:
Conventionally, endosseous dental implants have required 3 to 6 months of uninterrupted healing based on observations for dental implants that were characterized by a relatively smooth machined surface. Many studies have since demonstrated that implants with a roughened surface resulted in greater bone apposition, earlier bone contact, and a stronger bond between the implant and the bone, suggesting that implants with roughened surfaces could be loaded earlier than 3 to 6 months. Formal clinical studies confirmed that implants with rough surfaces can have abutments placed and be loaded occlusally as early as 6 weeks postplacement. The purpose of this prospective, human clinical investigation was to evaluate a large number of implants with a specific rough surface (sand-blasted acid-etched [SLA]) placed in everyday practice under routine private-practice conditions.

METHODS:

A prospective, multicenter, human clinical observational study was initiated with the goal of recruiting a minimum of 500 patients and 800 implants. The implants were to be placed and restored in predominantly private-practice settings around the world. Ninety-two practitioners in 16 countries agreed to participate, and 86 followed the study design. Patients had to be in good health, have sufficient bone to encase the implant, and agree to return for recall appointments. Exclusion criteria included heavy smoking (>10 cigarettes a day) and bone augmentation procedures at the implant site. All implants were two-piece (an abutment was to be placed after 6 weeks of healing) and were characterized by the presence of a transmucosal polished collar. Each implant had an SLA surface. All implants were positioned using a non-submerged (single-stage) surgical technique. Survival and success rates were calculated by life-table analyses.

RESULTS:

A total of 706 patients were enrolled and 1,406 implants were placed. In the final analyses, 590 patients with 990 implants (70.4% of those enrolled) met all inclusion criteria, including placement of an abutment and provisional restoration within 63 days of surgical placement. The majority of implants were 10 and 12 mm long (78.7%) and were placed in type II and III bone (87%). Seventy-three percent of the implants were placed in the mandible, and 27% were placed in the maxilla. The cumulative survival rate was 99.56% at 3 years and 99.26% at 5 years. The overall success rate was 99.12% at 3 years and 97.38% after 5 years.

CONCLUSIONS:

Under private-practice conditions, implants with an SLA surface could be placed and restored predictably within 6 to 8 weeks. Data from this prospective, multicenter, human observational study reinforced the results of more formal clinical studies and demonstrated that implants with the SLA surface can be restored in patients in approximately half of the time of conventional healing periods.
Validity and clinical significance of biomechanical testing of implant/bone interface.

Aparicio C, Lang NP, Rangert B.


Abstract

PURPOSE:

The aim of this paper was to review the clinical literature on the Resonance frequency analysis (RFA) and Periotest techniques in order to assess the validity and prognostic value of each technique to detect implants at risk for failure.

MATERIAL AND METHODS:

A search was made using the PubMed database to find clinical studies using the RFA and/or Periotest techniques.

RESULTS:

A limited number of clinical reports were found. No randomized-controlled clinical trials or prospective cohort studies could be found for validity testing of the techniques. Consequently, only a narrative review was prepared to cover general aspects of the techniques, factors influencing measurements and the clinical relevance of the techniques.

CONCLUSIONS:

Factors such as bone density, upper or lower jaw, abutment length and supracrestal implant length seem to influence both RFA and Periotest measurements. Data suggest that high RFA and low Periotest values indicate successfully integrated implants and that low/decreasing RFA and high/increasing Periotest values may be signs of ongoing disintegration and/or marginal bone loss. However, single readings using any of the techniques are of limited clinical value. The prognostic value of the RFA and Periotest techniques in predicting loss of implant stability has yet to be established in prospective clinical studies.

Reverse torque testing and early loading failures: help or hindrance?

Jividen G Jr, Misch CE.


Abstract

Reverse torque testing has been suggested to reduce the incidence of early loading failures during the first year of loading. However, the variables of bone density at stage II uncovering, the assessment of a small degree of implant rotation, and the effect of implant size and design have not been adequately evaluated. In addition, bone is weakest to shear forces, yet this is the primary force applied with reverse torque testing. This article reviews the benefits and disadvantages of reverse torque testing and suggests early crestal bone loss and failure.
of implants may be the result of this test, especially in less dense bone types. In addition, a
nomenclature of implant failures is introduced to improve the correlation of information in the
literature to the failure of implants in clinical practice.

Reintegration of mobilized titanium implants. An experimental study in rabbit
tibia.

Ivanoff CJ, Sennerby L, Lekholm U.


Abstract

The possibility of re-establishing a rigid bone-implant fixation, i.e. osseointegration, after
mechanical loosening of titanium implants, was evaluated in the rabbit tibia. Implants were
inserted to engage either one (10 mm long, n = 24) or two (16 mm long, n = 24) cortical
layers and were allowed to heal for six weeks. A re-entry was then made and 12 test
implants in each group subjected to a reverse torque procedure until the integration failed.
The remaining nonrotated 24 implants were left as controls. Thereafter all implants were
allowed to heal for an additional period of six weeks. At the end of the 12 weeks, the degree
of integration was assessed by measuring the removal torque for six test and six control
implants in each group of implant lengths. Histomorphometric measurements were also
performed on ground sections of the remaining test and control implants. A statistically
significantly higher removal torque was observed for the monocortical test implants than for the
control implants of either kind, however, no morphological differences could be revealed either, when comparing
monocortical and bicortical test and control implants. These results indicate that
osseointegrated implants that have been mobilized due to a traumatic disruption of the bone-
implant interface, may reintegrate if allowed to heal for an additional period of time.

Early loading of nonsubmerged titanium implants with a chemically modified
sand-blasted and acid-etched surface: 6-month results of a prospective case
series study in the posterior mandible focusing on peri-implant crestal bone
changes and implant stability quotient (ISQ) values.

Bornstein MM, Hart CN, Halbritter SA, Morton D, Buser D.


Abstract

PURPOSE:

The aim of this prospective case series study was to evaluate the short-term success rates of
titanium screw-type implants with a chemically modified sand-blasted and acid-etched (mod
SLA) surface after 3 weeks of healing.

MATERIAL AND METHODS:
A total of 56 implants were inserted in the posterior mandible of 40 partially edentulous patients exhibiting bone densities of class I to III. After a healing period of 3 weeks, all implants were functionally loaded with a screw-retained crown or fixed dental prosthesis. The patients were recalled at weeks 4, 7, 12, and 26 for monitoring and assessment of clinical and radiological parameters, including implant stability quotient (ISQ) measurements.

RESULTS:

None of the implants failed to integrate. However, two implants were considered "spinners" at day 21 and left unloaded for an extended period. Therefore, 96.4% of the inserted implants were loaded according to the protocol tested. All 56 implants including the "spinners" showed favorable clinical and radiographic findings at the 6-month follow-up examination. The ISQ values increased steadily throughout the follow-up period. At the time of implant placement, the range of ISQ values exhibited a mean of 74.33, and by week 26, a mean value of 83.82 was recorded. Based on strict criteria, all 56 implants were considered successfully integrated, resulting in a 6-month survival and success rate of 100.0%.

CONCLUSION:

This prospective study using an early-loading protocol after 3 weeks of healing demonstrated that titanium implants with the modified SLA surface can achieve and maintain successful tissue integration over a period of at least 6 months. The ISQ method seems feasible to monitor implant stability during the initial wound-healing period.

Early loading at 21 days of non-submerged titanium implants with a chemically modified sandblasted and acid-etched surface: 3-year results of a prospective study in the posterior mandible.

Bornstein MM, Wittneben JG, Brägger U, Buser D.


Abstract

BACKGROUND:

This study evaluates 3-year success rates of titanium screw-type implants with a chemically modified sandblasted and acid-etched surface (mod SLA), which were functionally loaded after 3 weeks of healing.

METHODS:

A total of 56 implants, inserted in the posterior mandibles of 39 partially edentulous patients, underwent undisturbed healing for 3 weeks. At day 21, the implants were fully loaded with provisional crowns. Definitive metal ceramic restorations were fabricated after 6 months of healing. Clinical measurements regarding soft tissue parameters and radiographs were obtained at different time points up to 36 months after implant placement. The soft tissue and radiographic parameters for the mod SLA implants after 3 years in function were compared to a historic control group of implants with an SLA surface using an early loading protocol after 6 weeks.
RESULTS:

None of the implants failed to integrate. However, two implants were considered "spinners" at day 21 and were left unloaded for an extended period. Therefore, 96.4% of the inserted implants were loaded according to the protocol tested. All 56 implants, including the "spinners," showed favorable clinical and radiographic findings at the 3-year follow-up examination. All 56 implants were considered successfully integrated, resulting in a 3-year survival and success rate of 100%. Dental implants with a mod SLA surface demonstrated statistically significant differences for probing depths and clinical attachment level values compared to the historic control group, with the mod SLA surface implants having overall lower probing depths and clinical attachment level scores.

CONCLUSION:

This prospective study using an early loading protocol demonstrates that titanium implants with the mod SLA surface can achieve and maintain successful tissue integration over a period of 3 years.