Dr. Neugarten & Dr. Tuminelli – The East coast experience: The zygomatic solution – should it be the first choice?

Quad Zygoma Immediate Load... an approach for restoring function to the severely resorbed Maxilla
Neugarten, Tuminelli, Sirota, and Korin (publication pending)


Accuracy of drilling guides for transfer from three-dimensional CT-based planning to placement of zygoma implants in human cadavers.

Abstract
The accuracy of surgical drilling guides was assessed for placement of zygoma implants. Six zygoma fixtures of length 45 mm (Nobel Biocare, Göteborg, Sweden) were placed in three formalin-fixed human cadavers using surgical drilling guides. The fabrication of these custom-made drilling guides was based on three-dimensional computed tomography (3D-CT) data for the maxillary-zygomatic complex. The installation of the implants was simulated preoperatively using an adopted 3D-CT planning system. In addition, anatomical measurements of the zygomatic bone were performed on the 3D images. The preoperative CT images were then matched with postoperative ones in order to assess the deviation between the planned and installed implants. The angle between the planned and actually placed implants was < 3 degrees in four out of six cases. The largest deviation found at the exit point of one of the six implants was 2.7 mm. The present study showed that the use of surgical drilling guides should be encouraged for zygoma implant placement because of the lengths of the implants involved and the anatomical intricacies of the region.

J Oral Maxillofac Surg. 2005 Sep;63(9):1325-8

Internal structure of zygomatic bone related to zygomatic fixture.
Kato Y, Kizu Y, Tonogi M, Ida Y, Yamane GY.

Abstract
PURPOSE: The purposes of this study were to investigate the internal structure of the edentulous zygomatic bone, which provides anchorage for the zygomatic fixture, using micro-computed tomography, and to examine the relation between the internal structure of the edentulous zygomatic bone and the zygomaticus fixture.

MATERIALS AND METHODS: Twenty-eight zygomatic bones of edentulous maxillae from cadavers were used. The mean age of cadaver specimens was 79.6 years. The specimens were analyzed using micro-computed tomography.

RESULTS: The internal structure of edentulous maxillae had thicker trabeculae in the region at the tip of the zygomaticus fixture than in other regions.

CONCLUSIONS: The present findings suggest that the presence of wider and thicker trabeculae at the end of the fixture promotes initial fixation. Also, when the trabeculae are able to support occlusal force after successful osseointegration, this thickening greatly aids the support of the fixture at the tip of the fixture, where stress is thought to be concentrated. In addition, the occlusal force was applied to the entire zygomatic bone. This preliminary study suggests that better understanding of the internal structure of the zygomatic bone will provide further information about the direction of installation of the zygomatic fixture, the ideal position of the zygomatic fixture, and the prognosis of implant therapy.
Clinical performance of screw- versus cement-retained fixed implant-supported reconstructions—a systematic review.

Witseboon JG, Milian C, Bragger U.

Abstract

PURPOSE: To assess the survival outcomes and reported complications of screw- and cement-retained fixed reconstructions supported on dental implants.

MATERIALS AND METHODS: A Medline (PubMed), Embase, and Cochrane electronic database search from 2000 to September 2012 using MeSH and free-text terms was conducted. Selected inclusion and exclusion criteria guided the search. All studies were first reviewed by abstract and subsequently by full-text papers independently. Data were extracted by two reviewers and statistically analyzed using a random effects Poisson regression.

RESULTS: From 4,324 abstracts, 321 full-text articles were reviewed. Seventy-three articles were found to qualify for inclusion. Five-year survival rates of 98.03% (95% confidence interval [CI]: 93.85% to 97.43%) and 95.55% (95% CI: 92.96% to 97.19%) were calculated for cemented and screw-retained reconstructions, respectively (P = .09). Comparison of cement and screw retention showed no difference when grouped as single crowns (I-SC) (P = .10) or fixed partial dentures (I-FDP) (P = .49). The 5-year survival rate for screw-retained full-arch reconstructions was 96.71% (95% CI: 93.66% to 98.31). All-ceramic reconstruction material exhibited a significantly higher failure rate than porcelain-fused-to-metal (PFM) in cemented reconstructions (P < .01) but not when comparing screw-retained reconstructions (P = .56). Technical and biologic complications demonstrated a statistically significant difference included loss of retention (P < .01), abutment loosening (P < .01), porcelain fracture and/or chipping (P < .02), presence of fistula/ suppuration (P < .001), total technical events (P = .03), and total biologic events (P = .02).

CONCLUSIONS: Although no statistical difference was found between cement- and screw-retained reconstructions for survival or failure rates, screw-retained reconstructions exhibited fewer technical and biologic complications overall. There were no statistically significant differences between the failure rates of the different reconstruction types (I-SCs, I-FDPs, full-arch I-FDPs) or abutment materials (titanium, gold, ceramic). The failure rate of cemented reconstructions was not influenced by the choice of a specific cement, though cement type did influence loss of retention.

Analysis of three-dimensional distortion of two impression materials in the transfer of dental implants.

Aquilino ML, Elias A, Vizzarrondo CE, Pfeifer WJ.

Abstract

STATEMENT OF PROBLEM: In dental implant restorations, a lack of passivity may be associated with mechanical failure. Passivity can be compromised during impression making.

PURPOSE: The purpose of this study was to compare the distortion of mechanically mixed polyether and hydrophilic addition silicone impression materials, and to evaluate the effect of intervening distance on distortion.

MATERIAL AND METHODS: Twenty impressions (10 polyether and 10 silicone) were made from a single mandibular definitive cast with 5 abutment analogs using standardized laboratory and technique protocols. The direct impression technique and mechanical mixing were used. A precision measuring machine established spatial coordinates of the impression copings in 3 dimensions, with the operator blinded to materials. Linear distances (concentricity) and angular inclinations (perpendicularity, parallelism) were calculated to measure impression distortion relative to the positions/angulations of the implants in the definitive cast. Distortion differences between materials and implant interocercing distances were tested using 2-factor ANOVA with an interaction term. A Bonferroni 2-sided test was used (alpha = .05).

RESULTS: No significant difference was found between the impression materials for parallelism (P = .91) and concentricity (P = .85). For perpendicularity, the silicone material had an average of 0.643 degrees less distortion (P = .004). With respect to interocercing distances, no significant differences were found for perpendicularity (P = .234), parallelism (P = .114), or concentricity (P = .346). An interaction term for material and coping distance was not significant.

CONCLUSIONS: Hydrophilic addition silicone and polyether impression materials have similar distortion effects for transfer procedures when using the direct impression technique and machine mixing. Silicone demonstrated superiority for perpendicularity distortion, though of a magnitude unlikely to have clinical significance.
Accuracy of impressions and casts using different implant impression techniques in a multi-implant system with an internal hex connection.

Wenz HJ, Herremans P

Abstract

PURPOSE: The aim of this study was to investigate the deviations of the implant positions of both impressions and casts using different impression materials and techniques. Furthermore, the existence of a correlation between the deviations of the impression and those of the cast was investigated.

MATERIALS AND METHODS: A reference model was fabricated with 5 Friadent implants parallel to each other. In a standardized experimental setting, 5 stone casts were produced with 5 different techniques using polyether (A) or polyvinylsiloxane (B through E). In 3 groups, a direct technique was used with a medium-viscosity material or a putty-tray material in combination with a light-viscosity syringe material (A to C). In 2 groups, an indirect technique (either 1-step [group D] or 2-step [group E]) was used with a putty-tray material in combination with a low-viscosity syringe material. The center-to-center distances were measured for impressions and casts in the horizontal plane using a computer-aided microscope, and the relative and absolute deviations compared to the reference model were calculated. Analysis of variance followed by the post-hoc Scheffé test (parametric data) or the Kruskal-Wallis test followed by pair-wise Mann-Whitney tests (nonparametric data) were used for statistical analyses. Deviations of impressions were compared with their respective casts using paired t tests and the Pearson correlation coefficient.

RESULTS: No significant differences for the relative deviations were found for impressions (-6 to -8 μm) or casts (+7 to +16 μm). Group E produced significantly higher absolute deviations for impressions (38 μm) and casts (39 μm) compared to the other groups (11 to 18 μm and 17 to 23 μm, respectively). A significant correlation between deviation of the impression and its respective cast was found for every group (r = 0.40 to 0.80), except group D.

CONCLUSIONS: The distortions in the horizontal plane of the casts obtained from the impression techniques of groups A to D would probably not affect the clinical fit of implant-retained superstructures. Because of the high variation of deviations (+113 to +124 μm), the 2-step technique cannot be recommended. The method to measure both impression and cast provided a better understanding of how inaccuracies are caused.

Finite element analysis of zygomatic implants in intrasinus and extramaxillary approaches for prosthetic rehabilitation in severely atrophic maxillae.

Ishak M, Kazir M, Sulaiman E, Kasim N

Abstract

PURPOSE: To compare the extramaxillary approach with the widely used intrasinus approach via finite element method.

MATERIALS AND METHODS: A unilateral three-dimensional model of the craniofacial area surrounding the region of interest was developed using computed tomography image datasets. The zygomatic implants were modeled using three-dimensional computer-aided design software and virtually placed according to the described techniques together with one conventional implant and a prosthesis. The bone was assumed to be linear isotropic with a stiffness of 13.4 GPa, while the implants were of titanium alloy with a stiffness of 110 GPa. Muscular forces were applied at the zygomatic arch and occlusal loads were applied to the surface of the prosthesis. The stresses and displacements generated on the surrounding bone and within the implant due to the simulated loading configuration were analyzed.

RESULTS: The bone-implant interface and zygomatic implant body for the intrasinus approach produced 1.41- and 4.27-fold higher stress, respectively, compared with the extramaxillary approach under vertical loading. However, under lateral loading, the extramaxillary approach generated 2.48-fold higher stress than the intrasinus at the bone-implant interface. The zygomatic implant in the extramaxillary approach had twofold higher micromotion than those with intrasinus approach under lateral loading.

CONCLUSIONS: No one technique was found to be superior; however, if lateral loading is used, the intrasinus approach is the most favorable for the rehabilitation of severely atrophic maxillae.
Changes in general and oral health-related quality of life in immediate or conventionally loaded dental implants: a nonrandomized clinical trial.

Dolci JSilvestre FG, Monteiro J

Abstract

PURPOSE: To evaluate changes in the general and oral health-related quality of life (using the European Quality of Life-5 Dimension [EQ-5D] and the Oral Health Impact Profile-49 [OHIP-49], respectively) of patients treated with conventionally or immediately loaded implants.

MATERIALS AND METHODS: This clinical trial consisted of a clinical oral examination and a questionnaire-based interview carried out before and after both surgery and definitive prosthetic rehabilitation in a consecutive sample of patients requiring dental implants. According to the clinical diagnosis and patient preference, patients were assigned to the immediate loading group (IL group, n = 29) or the conventional loading group (CL group, n = 75). The change summary scores and effect sizes were calculated in the intermediate stage and at the final follow-up, taking baseline scores as reference.

RESULTS: The oral health-related quality of life and oral satisfaction after implant therapy were significantly better than at baseline, with an even greater benefit when the implants were loaded immediately than when prosthetic rehabilitation was delayed. However, there were no significant differences in between-group comparisons in the ratings of general health status. The effect size for the OHIP-49 exceeded the threshold value of 0.8 for the domains functional limitation, pain/discomfort, and psychological discomfort in both groups and also for physical disability and psychological disability in the IL group.

CONCLUSIONS: A gradual improvement in oral well-being scores, but not in those of general well-being, were observed for both groups from the intermediate stage to the final evaluation. This benefit was markedly greater for the IL group.


Ten-year results for Branemark Implants immediately loaded with fixed prostheses at implant placement.

Schnitman PA, Wohrle PB, Rubenstein JE, DaSilva JD, Wang NH

@ Author information

Abstract

This investigation was initiated to develop a method to provide patients with a fixed provisional prosthesis placed at the time of implant placement. Sixty-three standard 3.75-mm Nobel Biocare implants of varying lengths were placed into mandibular sites in 10 patients and followed for up to 10 years. Twenty-eight implants were immediately loaded at implant placement, providing support for fixed provisional prostheses, while 35 adjacent implants were allowed to heal submerged and stress-free. Following a 3-month healing period, the submerged implants were exposed and definitive reconstruction was accomplished. All 10 prostheses supported by 28 implants placed into immediate function at the time of implant placement were successful during the 3-month healing period. Of these 28 implants placed into immediate function, 4 ultimately failed. Of the 35 submerged implants, all were osseointegrated and in function to date. Life-table analysis demonstrates an overall 10-year survival rate of 93.4% for all implants. The 10-year life-table analysis of survival is 94.7% for immediately loaded implants and 100% for submerged implants. Statistical analysis of the submerged versus immediately loaded implants demonstrates failure rates for immediately loaded implants to be significantly higher (P = .022 by the log rank test). These data demonstrate that although mandibular implants can be successfully placed into immediate function in the short term to support fixed provisional prostheses, long-term prognosis is guarded for those implants placed into immediate function distal to the incisor region.


Levi A, Psoter WJ, Agar JR, Reinstein ST, Taylor TD

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Abstract

PURPOSE: Dental implants are accepted as a successful alternative to conventional fixed and removable prostheses for the treatment of partial or complete edentulism. However, there have been few studies of the success of implants from the patients' perspective. The purpose of this study was to assess patient overall satisfaction with the outcome of treatment with maxillary anterior implants.

MATERIALS AND METHODS: A self-administered mailed questionnaire, which was developed for this project, and a data abstraction form, which was designed based on information available from the corresponding dental records of 123 eligible subjects, were utilized to survey implant patients.

RESULTS: Seventy-eight of 123 eligible subjects responded to the mailed, self-administered, structured questionnaire. Twelve of the 24 questionnaire variables demonstrated statistically significant bivariate associations with the dependent variable "overall patient satisfaction." Five variables—implant position, definitive restoration shape, appearance, effect on speech, and chewing capacity—were strongly associated with overall satisfaction. No demographic or treatment-related, dental record-abstracted variable, of the 25 that were examined, was statistically significant.

DISCUSSION: The practitioner who provides implant restorations should be aware of the multidimensional aspects of patient satisfaction with implant treatment. This study suggests that patient satisfaction with key elements influences the overall acceptance of maxillary anterior implant prostheses, which are esthetically critical. Communication between dentist and patient is important to achieve optimal results that will be satisfactory to both. Discussion of treatment limitations may also help patients to develop realistic expectations of the final result.

CONCLUSIONS: In this limited investigation, patient satisfaction with implant position, restoration shape, overall appearance, effect on speech, and chewing capacity were critical for patient overall acceptance of the dental implant treatment.

Maxillary anterior papilla display during smiling: a clinical study of the interdental smile line.
Hochman MN¹, Chu SJ, Tarnow DP

Abstract
The purpose of this research was to quantify the visual display (presence) or lack of display (absence) of interdental papillae during maximum smiling in a patient population aged 10 to 99 years. Four hundred twenty digital single-lens reflex photographs of patients were taken and examined for the visual display of interdental papillae between the maxillary anterior teeth during maximum smiling. Three digital photographs were taken per patient from the frontal, right frontal-lateral, and left frontal-lateral views. The data set of photographs was examined by two examiners for the presence or absence of the visual display of papillae. The visual display of interdental papillae during maximum smiling occurred in 368 of the 420 patients examined in this study, equivalent to a 91% occurrence rate. Eighty-seven percent of all patients categorized as having a gingival smile line (n = 363) were found to display the interdental papillae upon smiling. Differences were noted for individual age groups according to the decade of life as well as a trend toward decreasing papillary display with increasing age. The importance of interdental papillae display during dynamic smiling should not be left undiagnosed since it is visible in over 91% of older patients and in 87% of patients with a low gingival smile line, representing a common and important esthetic element that needs to be assessed during smile analysis of the patient.

Catastrophic failure of a monolithic zirconia prosthesis.
Chang IS¹, Ji Y², Choi CH², Kim S³.

Abstract
Recently, monolithic zirconia restorations have received attention as an alternative to zirconia veneered with feldspathic porcelain to eliminate chipping failures of veneer ceramics. In this clinical report, a patient with mandibular edentulism received 4 dental implants in the interforaminal area, and a screw-retained monolithic zirconia prosthesis was fabricated. The patient also received a maxillary complete removable dental prosthesis over 4 anterior roots. At the 18-month follow-up, all of the zirconia cylinders were seen to be fractured, and the contacting abutment surfaces had lost structural integrity. The damaged abutments were replaced with new abutments, and a new prosthesis was delivered with a computer-assisted design and computer-assisted manufactured fabricated titanium framework with denture teeth and denture base resins. At the 6-month recall, the patient did not have any problems. Dental zirconia has excellent physical properties; however, care should be taken to prevent excessive stresses on the zirconia cylinders when a screw-retained zirconia restoration is planned as a definitive prosthesis.

Combined immediate loading of zygomatic and mandibular implants: a preliminary 2-year report of 19 patients.
Rutala DC, Galindo DF

Abstract
PURPOSE: A retrospective study was performed to evaluate the feasibility of simultaneous use of immediately loaded zygomatic and mandibular implants for full maxillomandibular restoration.

MATERIALS AND METHODS: A total of 40 zygomatic and 112 conventional implants were placed in 19 edentulous and partially edentulous patients and restored with full-arch acrylic resin prostheses within 3 hours of surgery. Implant insertion torque values were between 35 and 45 Ncm.

RESULTS: During the 1-year follow-up period, none of the 19 patients experienced implant or prosthesis failures. The patients did not experience any sinus infections or any other surgical complications from the performed procedures.

CONCLUSION: Zygomatic and conventional implants can be simultaneously placed in the maxilla and mandible and successfully loaded with an acrylic resin prosthesis using the All-on-Four concept.
The precision of fit of cast and milled full-arch implant-supported restorations.

Perni G¹, Bettini E, Meneghelli B, Ceretti A, Gobbato FA, Bressan F

Abstract

PURPOSE: The purpose of this study was to investigate the marginal precision of computer numeric control-milled frameworks fabricated of grade 4 commercially pure titanium or cobalt-chrome alloy through digital technology and to compare them with conventional cast frameworks.

MATERIAL AND METHODS: A titanium cast of a mandibular arch with six implant analogs was used as a master. The master cast was measured with a coordinate measuring machine. Fifteen rigid anatomic frameworks were created on the master cast in cast gold alloy and milled in titanium or cobalt-chrome material. The fifteen anatomic frameworks were measured in the same manner as the master cast. While the milled frameworks were measured once, at the end of the milling process, the cast anatomic frameworks were measured twice: immediately after the casting and divesting procedures and again after a technical adaptation procedure. Each anatomic framework was weighed. To compare the measurements obtained from each group of frameworks, descriptive statistics were calculated and one-way analysis of variance was performed, with values considered statistically significant at P < .05.

RESULTS: The mean weight of the cast frameworks was 33.41 g, the cobalt-chrome frameworks weighed 18.12 g on average, and the titanium frameworks averaged 8.7 g. The mean values for three-dimensional deviation of the center point position for each group of frameworks were 261 µm (cast frameworks before adaptation), 49 µm (cast frameworks after adaptation), 26 µm (milled frameworks in cobalt-chrome), and 26 µm (milled frameworks in titanium).

CONCLUSIONS: Within the limitations of this in vitro study, absolute passive fit cannot be achieved, regardless of material and fabrication technique. Anatomic milled frameworks fabricated in titanium or cobalt-chrome presented reduced center point deviation compared to cast frameworks. Titanium frameworks weighed less than cobalt-chrome and cast gold alloy frameworks.