[1] The Influence of Titanium Surfaces in Cultures of Neonatal Rat Calvarial Osteoblast-Like Cells: An Immunohistochemical Study [Pages 4-5]


The Influence of Titanium Surfaces in Cultures of Neonatal Rat Calvarial Osteoblast-Like Cells: An Immunohistochemical Study

Authors:
Aybar B., Emes Y., Atalay B., Tanrikulu S.I., Kaya A.S., Issever H., Ceyhan T, and Bilir A.

Study device:
SLA surface.

Study Objective:
The goal of this study was to evaluate the behavior of neonatal rat calvarial osteoblast-like cells cultured on different titanium discs with different surface roughness properties and of different composition. DNA synthesis, number of cells, and cell viability were evaluated. Cells were also analyzed for the possible changes in morphology by scanning electron microscopy (SEM).

Study design:
Sandblasted acid etched (SLA) surfaces of 2 different companies with different alloy properties were used. These were named as SLA-1 and SLA-2. The osteoblasts behavior were analyzed on sand blasted acid etched (SLA-1) surface (Straumann, Basel, Switzerland), sand blasted-acid etched (SLA-2) surface (Alpha bio, Petach-tikva, Israel), acid etched surface (Alpha bio), machined surface (Alpha bio). To analyze the effect of titanium surfaces on cell proliferation, cell numbers, and cell viability cells were cultured on titanium discs for 7 days and measurements were held out at 24 hours and on day 7. Cell proliferation rate was assessed by bromodeoxyuridine (BrdU) immunohistochemical technique. Cell morphologies were evaluated by scanning electron microscopy.

Results:
The highest number of BrdU labeled cells were seen on SLA-1 group at the end of 24 hours. The number of cells was found to be the highest in the acid-etched group on the 7th day, even though there were no significant differences between the groups at the end of 24 hours. Scanning electron microscopy views showed the morphological differences between the groups. Osteoblasts were able to proliferate on all of the tested surfaces, with differences in cell count and DNA synthesis values between the groups.
BrdU incorporations of the SLA-1, SLA-2, AE, and MS groups on the 7th day. a, cells on 7th day on SLA-1 surface (bar 100 µm). b, cells on 7th day on SLA-2 surface (bar 100 µm). c, cells on 7th day on AE surface (bar 200 µm). d, cells on 7th day on MS (bar 100 µm).

SEM views of the osteoblast-like cells cultured on CD, SLA-1, SLA-2, AE, and machined surfaces on 7th day. a, SEM images of the SLA-1 group on the 7th day shows cells of polygonal shape. Mitosis dividing is also observed. And there is a firmly connection and decreased number of villi are seen in this group (bar 50 µm). b, SEM images of the SLA-2 group on the 7th day, cells with the loss of villi in the connecting surfaces of the cells (bar 20 µm). c, cells on 7th day on AE surface, shortening of cytoplasmic extensions is observed. Cytoplasmic extensions are fewer in number (bar 20 µm). d, cells on 7th day on machined surface (bar 20 µm).

Conclusion:
Even though our results show no differences between the groups for cell proliferation, cell viability, and DNA synthesis, which can be considered as clinically significant, SLA surface implants are being widely used today for their mechanical increased stability in bone. Implant surface characteristics may modulate the biological response of osteoblast-like cells depending on the manufacturing techniques and cell culturing procedures.

The full article:
Osseointegration is an essential requirement for allowing the survival of dental implants in the jaw bone. Factors such as unfavorable stress distribution, surgical trauma, implant-abutment microgap, and bacterial infiltration can detrimentally affect osseointegration (1, 2) and accelerate bone loss.

According to the literature, most if not all implants will cause to some extent marginal bone loss (MBL) during their lifetime (3). Efforts have been made to reduce MBL and to avoid its associated complications. Studies have shown that several factors such as implant surface quality (4) implant neck macro and micro design (5) and crestal implant position (6) play particularly crucial roles in osseointegration.

Surface area may be increased using proper modification techniques, either by addition or subtraction procedures. Surface treatments can also be classified as mechanical, chemical, and physical methods. Surface treatments of dental implants are used to modify their topography and energy, resulting in improved wettability, increased cell proliferation and growth, and in accelerated osseointegration (7).

Alpha-Bio Tec.’s Sand blast Large grit Acid etch (SLA) implant surface is created through two processes: a sand-blasting process for a macro surface of 20-40 microns and a double thermal acid etching process to create micro pitting between 1-5 microns.

There is no consensus in the literature concerning the effectiveness of various implant surface neck configurations and their effect on MBL. The aim of this review is to compare the influence of machined and SLA neck surface on MBL levels during the implant’s existence in the bone.

Limited available data suggests that smooth surfaces (machined) are less involved in peri-implantitis than rough surface implants (8). This observation is potentially supported by reduced plaque accumulation around the implants with a reduced roughness (9). However, further research has shown that surface porosity impacts on osseointegration by allowing direct 3D ingrowth of osteogenic cells into the implant, thereby strengthening the bone-implant interface (10).

Acid etched surfaces enhance the osseointegration by increasing cell adhesion and bone formation (7). This hypothesis was demonstrated in in-vitro studies showing osteoblasts growing on SLA surfaces. These osteoblasts are highly differentiated bone cells, suggesting that this pitted surface enhances bone cell-implant integration (11).

Preclinical and clinical studies suggest that there are several factors that individually and cumulatively influence MBL levels. Therefore, studies have been conducted that typically combine two or more crestal neck features to evaluate the best combination of features to reduce MBL.

Certain studies did not confirm that a rough surface combined with a microthreaded neck has a positive effect on the MBL (12). However, the majority of the reviewed works show a different picture.
Bratu et al. (2009) compared marginal bone loss between implants with SLA treatment and coronal microthreads and polished neck implants. The results showed statistically significant lower MBL in combined SLA/microthread implants.

Another study showed a greater bone loss in implants with a machined surface neck design without microthreads in the first year (9).

The long term study of Piao et al. showed that a rough surface with micro-threads at the coronal part of implant maintained the marginal bone level against functional loading better than implants without these two features after a follow up of one year (13) and confirmed these results after a three year follow up (14).

Additionally, Shin et al. (2006) have shown in their work that a rough surface and micro-threads at the implant neck not only reduce crestal bone loss but also help with early biomechanical adaptation against loading in comparison to the machined neck design. They concluded that a rough surface with microthreads at the implant neck is the most effective design in maintaining the marginal bone level against functional loading (15).

In another study, a correlation between collar design, implant placement and MBL in a canine model was evaluated. The study data showed that the placement of a polished area subcrestally facilitates higher rates of early MBL (6), whereas a rough implant surface placed at the bone level reduces the amount of this bone loss (16, 17).

Conclusion:
Based on the reviewed literature, we can conclude that marginal bone changes around rough-surfaced micro-threaded neck implants are significantly lower than in polished or rough surfaced implants.

All Alpha-Bio Tec.’s implants have rough SLA surface and microgrooves which contribute to osseointegration and reduce MBL.

References:
Author:
Assaf Sharon, R&D, Alpha-Bio Tec.

Study device:
Alpha-Bio Tec advanced drills.

Study Objective:
To validate drill performance with the Alpha Bio Tec’s designed system which measures heat generation and mechanical forces.

Study design:
A broad literature review was performed and summarized various design features that should be adjusted in order to:
- Create minimal temperature rise during the drilling process
- Optimize drilling stability
- Ease penetration
These features were implemented in Alpha-Bio Tec’s advanced drills design and planning.
### Feature summary:

<table>
<thead>
<tr>
<th>Drill Parameter Design</th>
<th>Literature Suggested</th>
<th>Selection Explanation</th>
<th>Alpha-Bio Tec Drills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of coolant</td>
<td>External irrigation</td>
<td>External irrigation is more efficient than internal irrigation on the surface and at the upper section of the osteotomy (dense cortical section). Field experience shows blockage on internal irrigation lumen.</td>
<td>External irrigation</td>
</tr>
<tr>
<td>Flutes</td>
<td>3 flutes</td>
<td>Three flutes exhibit superior bending stiffness. Theoretically, they should also exert less heat on the bone due to enhanced cutting efficiency and less torques at larger drill's diameter.</td>
<td>3 flutes design</td>
</tr>
<tr>
<td>Helix Angle</td>
<td>10°-30°</td>
<td>For surgical drills, the range of 10°-30° helix angle is recommended to have best cutting efficiency, according to literature and Alpha-Bio Tec's testing.</td>
<td>Within the range</td>
</tr>
<tr>
<td>Rake Angle</td>
<td>20°-30°</td>
<td>An optimum rake of 20°-30° was recommended to have best cutting efficiency.</td>
<td>Within the range</td>
</tr>
<tr>
<td>Relief &amp; Body</td>
<td>With both</td>
<td>Clearance Both relief angle and body clearance reduce the heat generation due to the reduced bone to drill contact during osteotomy preparation.</td>
<td>Both included</td>
</tr>
<tr>
<td>Point Angle 90° (Initial drill)</td>
<td>90°</td>
<td>90° point angle for the initial drills.</td>
<td>90°</td>
</tr>
<tr>
<td></td>
<td>100°-130° (all other drills)</td>
<td>Range of 100°-130° point angle for all following drills diameters.</td>
<td>Within the range</td>
</tr>
<tr>
<td>Step vs. Straight</td>
<td>Step</td>
<td>Step drill bit has a highly effective design that minimizes temperature elevation due to gradual removal of material from the drilling site. Step drill assists in centralizing the drilling process due to the lower drill step leading the way through the predrilled site. Step drills increase osteotomy accuracy in cases where drill sequence requires cortical release.</td>
<td>Alpha-Bio Tec supplies both Step &amp; Straight</td>
</tr>
</tbody>
</table>
Principal investigator:
Dr. Dirk Duddeck.

Study device:
SPI implant.

Study Objective:
The goal of this study was to evaluate the behavior of neonatal rat calvarial osteoblast-like cells cultured on different titanium discs with different surface roughness properties and of different composition. DNA synthesis, number of cells, and cell viability were evaluated. Cells were also analyzed for the possible changes in morphology by scanning electron microscopy (SEM).

Study objective:
The aim of the study is to verify improvements of manufacturing and quality management as well as to demonstrate the high quality level of the participating manufacturers and implant companies.

Study design:
SEM device used for the acquisition of the surface topography (Phenom proX, Phenom-World, Eindhoven, Netherlands) has a highly sensitive detector for backscattered electrons (BSE) that facilitates inferences about the composition of the examined material as the so-called material contrast image emerges. Elements with a low atomic number, i.e. with fewer electrons, such as carbon or aluminium are shown as relatively dark areas, while elements with high atomic numbers such as titanium or zirconium appear relatively bright.

Qualitative and quantitative elemental analysis of the implant surfaces was performed using energy-dispersive X-ray spectroscopy (EDX). Here, the electron beam causes the primary electrons emitted to interact with the atoms of the specimen surface, releasing electrons of the inner shell as “secondary electrons”. The resulting gaps are immediately filled by electrons from a higher orbital. The difference in energy is emitted as an X-ray quantum and detected by a thermoelectrically cooled detector, measuring both the elemental compositions and their concentrations. A real analysis and one or more spot analyses (in case of irregularities) were performed for each implant.
SPI Surface topography

In the EDX area analysis was found only the following elements:

- Ti 88.7%
- Al 6.7%
- V 4.6%

Current report was part of the "SEM surface analyses of 120 sterile-packed implants" performed by DR DIRK DUDDECK, DR HASSAN MAGHAIREH, DR FRANZ-JOSEF FABER AND DR JÖRG NEUGEBAUER in University of Cologne.

The study has found Alpha-Bio's implant to be with no significant contamination.

The full article:
Adsorption of human plasma proteins to modified titanium surfaces

Authors:
Sela MN., Badihi L., Rosen G., Steinberg D., Kohavi D.

Study device:
Ti disks.

Study Objective:
The aim of this study was to examine the effect of modified titanium (Ti) surfaces on the initial events of plasma proteins adsorption.

Study design:
‘Ti disks’ with three types of surface modifications were compared: machined, acid-etched and acid-etched and blasted. Physical and chemical characterizations of the surfaces were performed via scanning electron microscopy (SEM), atomic force microscopy (AFM) used for analysis of surface topography, characterization of the titanium oxide (TiO2) layer was carried out by X-ray photoelectron spectroscopy (XPS) and characterization of surface energy by the determination of contact angles. Evaluation of plasma proteins’ adsorption to the treated Ti surfaces was performed by mass spectrometry, confocal laser scanning microscopy and XPS. Quantitative proteins’ assessment was carried out by enzyme-linked immunosorbent assay.

Results:
SEM images revealed major differences in the topography of the examined surfaces. Acid-etched and blasted Ti surfaces were found to have higher roughness values and a thicker TiO2 layer as compared with acid-etched and machined surfaces. Moreover, acid-etched and blasted surfaces showed high surface area differentiation, pointing to a high increase in the three-dimensional (3D) surface area over the 2D surface area compared with the other surfaces. Adsorption of plasma proteins to the acid-etched and blasted Ti surfaces was both qualitatively and quantitatively more intense compared with the machined and acid-etched surfaces. This was shown for each examined protein, total proteins and by the removal degree of the protein coat.
Conclusion:

The preferential adsorption of plasma proteins and particularly of fibronectin to Ti surfaces and specifically to acid-etched and blasted surfaces may play an important role during the biological events that follow implants’ insertion.

The full article:
www.ncbi.nlm.nih.gov/pubmed/17484735
**Alpha-Bio Tec.** Quality Assurance (QA) department performs a routine Quality Assurance (QA) and Quality Control (QC) procedures.

**Authors:**
Polina Pavlovsky and Osnat Harari, QA, Alpha-Bio Tec and Prof Ofer Moses.

**Study device:**
Alpha-Bio Tec. SPI dental implants.

**Study Objective:**
This study describes routine Quality Assurance (QA) and Quality Control (QC) procedures performed by the Alpha-Bio Tec. QA department on implants, and to demonstrate the composition and chemical bonding analysis of Alpha-Bio Tec. dental implant.

**Alpha-Bio Tec. Implant Surface:**
The Alpha-Bio Tec. Implant Surface is created through a sand-blasting process to form a macro surface of 20-40 microns and a double thermal acid etching process to create micro pitting between 1 to 5 microns. The advantages of this implant surface - confirmed by retrospective clinical data showing an overall clinical success rate of 98.3% and a 99.6% when using the immediate loading procedure.

**QA, QC and Regulation:**
Alpha-Bio Tec. products are compliant with the following systems and standards: ISO 13485:2003, The Canadian Medical Devices Conformity Assessment System, Council Directive 93/42/EEC. SPI implants have also the FDA approval for immediate loading.
The Design:

Implant surface was observed by SEM (Scanning electron microscopy) with (Backscattered electron imaging) BSE and (Secondary electron imaging) SE field. SEM images were taken from various parts of the implant.

Conclusion:

The report demonstrates the excellent surface cleanliness and structure of Alpha-Bio Tec. implants through SEM and XPS examinations. The atomic composition that is demonstrated in this report, proves the excellent purity of the ABT implant.

(X-ray photoelectron spectroscopy) XPS is a surface-sensitive quantitative spectroscopic technique measures the elemental composition.

The full article:

Published Clinical Studies

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[8] The efficacy of full-arch immediately restored implant-supported reconstructions in extraction and healed sites: a 36-month retrospective evaluation.

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[10] Bovine bone matrix/poly(L-lactic-co-ε-caprolactone)/gelatin hybrid scaffold (SmartBone®) for maxillary sinus augmentation: A histologic study on bone regeneration

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[11] Differences in crestal bone-to-implant contact following an under-drilling compared to an over-drilling protocol. A study in the rabbit tibia

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[Pages 28-29]
Dental Implant Thread Design and the Consequences on Long-Term Marginal Bone Loss

Effect of repeated closures on opening torque values in seven abutment-implant systems

Histological and radiological evaluation of sintered and non-sintered deproteinized bovine bone substitute materials in sinus augmentation procedures. A prospective, randomized-controlled, clinical multicenter study
Implant-prosthetic rehabilitation of the edentulous maxilla and mandible with immediately loaded implants: preliminary data from a retrospective study, considering time of implantation

Authors:
Strietzel FP, Karmon B, Lorean A, Fischer PP.

Study device:
1. Alpha-Bio Tec DFI dental implants.
3. Alpha-Bio Tec SPI dental implants.

Study Objective:
This study sought to evaluate treatment outcomes of implant-prosthetic rehabilitation with implants in the edentulous maxilla or mandible that were immediately loaded by fixed prostheses. Special consideration was given to the time of implantation (immediate, delayed, or late implant placement).

Study design:
Twenty-five patients who received 283 immediately loaded screw-type implants were included in this retrospective study. Data captured included patient file information, panoramic and periapical radiographs obtained during treatment, and clinical parameters examined during the recall period. Clinical and radiographic status of peri-implant soft and hard tissue was evaluated, as well as the function of prostheses and subjective assessment by the patients of the treatment. Survival/success rates were analyzed with respect to the time of implantation.

Results:
Following a maximum observation period of 120 months (median 29 months) post-implantation and subsequent immediate functional loading, implant survival was 99.6% (one implant failed after 20 months). The success rates were 98.2% for implants and 88% for patients; five implants in three patients did not meet success criteria. Neither the implant site nor the time of implantation were associated with unsuccessful outcomes. Implant-related evaluations revealed a significant association between implant success and implant length of 10 mm or less (P < .018).

Conclusion:
Within the limits of this study, immediate loading of rough-surfaced, screw-type implants supporting fixed dentures for the treatment of edentulous maxilla or mandible appears to be a reliable treatment option with a high probability of success. The time of implantation (immediate, delayed or late) did not influence implant survival or success rates.

The full article:
The efficacy of full-arch immediately restored implant-supported reconstructions in extraction and healed sites: a 36-month retrospective evaluation.

Authors:
Artzi Z, Kohen J, Carmeli G, Karmon B, Lor A, Ormianer Z.

Study device:
1. Alpha-Bio TeC DFI dental implants.
2. Alpha-Bio TeC ITO dental implants.
3. Alpha-Bio TeC SPI dental implants.

Study Objective:
The aim of this retrospective study was to compare the outcome of immediately loaded implants that were placed either in fresh extraction sites or in healed edentulous sites with 6, 18 and 36 months of follow up.

Study design:
Treatment with a full-arch implant prosthesis, either screw-retained or cemented, was assigned to 54 patients. A total of 676 implants (DFI n=515, ITO n=20, SPI n=141) were placed in either immediate extraction sites (n = 367) or in healed alveoli (n = 309), followed by placement of a one-piece provisional prosthesis. The definitive restoration was placed 3 to 6 months after implant placement. Clinical parameters were recorded and digital radiographs obtained at 6, 18, and 36 months.

Results:
Osseointegration failed in 21 (3.1%) implants; 13 of these (62%) had been placed immediately after extraction. All occurred within 2 months of the surgical healing phase. Short (8-mm) and narrow (3.3-mm) implant configurations were significantly (P < .05) associated with failure. At 6, 18, and 36 months, average crestal bone resorption was 0.18 mm, 0.55 mm, and 0.79 mm for implants placed in fresh extraction sites and 0.31 mm, 0.78 mm, and 1.1 mm for implants placed in healed alveoli, respectively. These differences were statistically significant (P < .05 between sites at all examined periods). Crestal bone resorption also correlated to sites with simultaneous bone augmentation and implant placement.

Conclusion:
Clinical parameters proved equable whether implants were placed immediately post-extraction or in a healed alveolar ridge. Cross-arch immediate loading of implants placed in extraction and/or healed edentulous sites were predictable and maintainable, as evaluated periodically after 3 years’ observation.

The full article:
Residual Roots as an Anatomical Guide for Implant Placement: Case Series With Two-Year Follow-up

Authors:
Mahesh L., Kurtzman GM., Schwartz D., Shukla S.

Study device:
SPI implants.

Study Objective:
The aim of this study is to assess the success rate of 100 implants placed in 57 patients when the residual roots were used as anatomical guides for osteotomy.

Study design:
One hundred implants were placed in 57 patients. Those patients selected for surgery had grossly carious teeth or root canal–treated fractured crowns. Three to 4 weeks after complete prophylaxis, patients were appointed for surgery. Osteotomies were placed through intact residual roots, which acted as anatomical guides for implant surgical placement. Four types of implants were used for this study: 47 Bioner TOP DM (Barcelona, Spain) implants with a diameter of 4 mm, 20 Nobel Biocare Replace (Yorba Linda, Calif) implants with a diameter of 4.3 mm, 25 Biohorizons (Birmingham, Ala) implants with a diameter of 4.6 mm, and 8 Alpha-Bio Tec (Tel Aviv, Israel) implants with a diameter of 4.2 mm. All implants received a 2-stage submerged healing protocol. Following 3 months of site healing to allow integration of the implant and maturation of the osseous graft, the implants were uncovered and prosthetics fabricated. X-rays were taken 2 years after restoration.

Results:
Patients had a follow-up period of 2 years, and in that time none reported discomfort after implant placement. A radiograph taken at the routine prophylaxis appointment at 2 years postrestoration demonstrated a lack of bone loss at the crestal level and maintenance of the implants and surrounding bone. There were no signs of peri-implantitis observed in any of the patients. Of all the implants placed, the Bioner TOP DM implant showed the least amount of crestal bone loss. Placing implants through residual roots as an anatomical guide is a useful technique that shows good results over a 2-year follow-up period.

Conclusion:
This treatment approach can be regarded as a useful method for placement of implants. On the other hand, the remaining root fragments do not pose any risk in the process of osseointegration. The results of the present series of cases showed no deleterious reaction during the healing period, during loading implant placement, or during the 2-year follow-up period. Radiographically, the bone–implant interface did not demonstrate any abnormal characteristics. Clinically, the reason for these positive results may be attributed to the fact that the sites were asymptomatic and free of inflammation before implant treatment. Otherwise, periapical inflammation can occur and endanger the implant.

The full article:
www.ncbi.nlm.nih.gov/pubmed/26389698

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Bovine bone matrix/poly(L-lactic-co-ε-caprolactone)/gelatin hybrid scaffold (SmartBone®) for maxillary sinus augmentation: A histologic study on bone regeneration

Authors:
Delfo D’Alessandro, Giuseppe Perale, Mario Milazzo, Stefania Moscato, Cesare Stefanini, Gianni Pertici, Serena Danti.

Study device:
Alpha-Bio’s Graft Bioactive Bone (SmartBone®)

Study Objective:
This study aimed at performing an extensive histological investigation to assess the biologic processes leading to new bone formation in 5 patients treated with granular SmartBone® for sinus floor augmentation.

Study design:
Biopsies were collected from 5 patients who underwent sinus lift procedure with granular SmartBone® (Industrie Biomediche Insubri S/A, Mezzovico-Vira, Switzerland) prior to dental implant placement. SmartBone® was applied by dental surgeons following the instruction for use, as reported by the manufacturer. Bone samples, routinely removed to create a pilot hole for further implant insertion, were used for this study. These samples were cut with a trephine burr and collected at different time points post SmartBone® implantation, namely 4, 4, 6, 7 and 9 months. Bone-particle conductivity index (BPCI) was used to assess SmartBone® osteoconductivity.

Results:
At 4 months, SmartBone® (12%) and new bone (43.9%) were both present and surrounded by vascularized connective tissue (37.2%). New bone was grown on SmartBone® (BPCI = 0.22). At 6 months, SmartBone® was almost completely resorbed (0.5%) and new bone was massively present (80.8%). At 7 and 9 months, new bone accounted for a large volume fraction (79.3% and 67.4%, respectively) and SmartBone® was resorbed (0.5% and 0%, respectively). Well-oriented lamellae and bone scars, typical of mature bone, were observed. In all the biopsies, bone matrix biomolecules and active osteoblasts were visible. The absence of inflammatory cells confirmed SmartBone® biocompatibility and non-immunogenicity.
Histomorphometric analysis showing volume percentages of new bone, SmartBone1, connective tissue, and other tissues in the biopsies taken at the following times post SmartBone1 implantation: (A) 4 months (Biopsy #1); (B) 4 months (Biopsy #2); (C) 6 months; (D) 7 months; (E) 9 months. The results show the timeline of SmartBone1 resorption (13.5% to 0%) and new bone formation (ranging in 40.3%–80.8%). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)
Conclusion:
The obtained outcomes showed that SmartBone® is osteoconductive, promotes fast bone regeneration, leading to mature bone formation in about 7 months.

The full article:
Differences in crestal bone-to-implant contact following an under-drilling compared to an over-drilling protocol. A study in the rabbit tibia

Authors:
Cohen O., Ormianer Z., Tal H., Rothamel D., Weinreb M., Moses O.

Study device:
1. Alpha-Bio® ICE dental implants.

Study Objective:
The aim of the study was to compare bone-to-implant contact (BIC) between implants inserted at high torque (≥35 Ncm) due to under-drilling of the crestal bone to those inserted at low torque (<10 Ncm) due to over-drilling of the crestal bone.

Study design:
Ten male New Zealand white (NZW) rabbits at 21–23 weeks of age (3–3.5 kg) were used in this study. In each tibia, one implant of under-drilling (UD) and one of the over-drilling (OD) were inserted alternately. A total of four implants (two OD and two UD) were installed in each rabbit. In the UD group, SPI® implants with a coronal diameter of 3.75 mm were inserted with bicortical stabilization at torque ≥35 Ncm. In the OD group, ICE implants with a coronal diameter of 3.55 mm were inserted with torque of <10 Ncm. X-rays of the tibiae were taken before and following surgeries to verify the implant location. Twenty-one days following the first implantation, the left leg was subjected to the same surgical procedure. (Fig.1) The animals were sacrificed 6 weeks after the second surgery implantation. The extracted blocks containing implants were dissected and stained with toluidine blue for evaluation of new bone formation. Crestal bone-to-implant contact (c-BIC, within the crestal compact bone) and total BIC (t-BIC, along the entire implant) were calculated with ImageJ at a magnification of ×100.

Fig 1.
Results:

Histological examination revealed that at 3 weeks, implants inserted with an under-drilling (UD) protocol presented areas of bone resorption along the thread pitch while areas of new bone formation were observed within the thread valleys. (Fig 2-3,5) At 6 weeks, histological sections of both groups presented extensive bone remodeling. No differences in t-BIC were noted at 3 weeks (18.3 ± 1.6 vs 14.6± 1.3 %) and at 6 weeks (21.8 ± 1.9 vs 23.8± 2.0 %) between the OD and UD groups, respectively. (Fig. 4)
Fig. 4 Micrographs of 6-week sites.
a Representative section of an implant from the UD group.
b Representative section of an implant from the OD group. Bone remodeling and maturation are apparent in both sections with a more mature bone in the OD group section. Magnification ×100

Fig. 5 Mean (±se) c-BIC at 3 weeks (3W) of implants inserted with an over-drilling protocol (OD) and implants inserted with an under-drilling protocol (UD). * denotes p <0.05

Conclusion:
Within the limitations of the present study, insertion of implants with a high torque following an under-drilling protocol (commonly used for immediate loading) may reduce short term crestal bone-to-implant contact. On the other hand, over-drilling of the crestal aspect of the osteotomy may result in increased crestal bone-to-implant contact. Further studies using other implant systems and animal models should be conducted to confirm these results.

The full article:
www.ncbi.nlm.nih.gov/pubmed/26931772
Effect of implant insertion and loading protocol on long-term stability and crestal bone loss: A comparative study

Authors:
Kohen J., Matalon S., Block J., and Ormianer Z.

Study device:
1. Alpha-Bio Tec ICE dental implants.
2. Alpha-Bio Tec DFI dental implants.
3. Alpha-Bio Tec Arrow dental implants.

Study Objective:
The purpose of this study was to compare the long-term outcomes of different implant insertion and loading protocols on crestal bone loss.

Study design:
This retrospective comparative study was performed on a data of 1688 implants that were implanted in 343 patients. (Fig. 1)

<table>
<thead>
<tr>
<th>388 SPI</th>
<th>911 DFI</th>
<th>62 arrow implants</th>
<th>241 TSV zimmer</th>
<th>86 Maestro biohorizons</th>
</tr>
</thead>
</table>

Fig 1. Distribution of included implants

Patients' records were thoroughly reviewed for medical and dental histories, detailed clinical and radiographic examination, including CT scans, evaluations of oral hygiene, and performance of at least 1 annual hygiene prophylaxis and clinical monitoring. This study spanned 15 years, during which different materials and methods were in use. The surgical procedures were performed by 2 periodontists, 3 maxillofacial and oral surgeons, and 1 general practitioner. The implantation area was incised and flap was elevated. When the socket was more than 1 mm wider than an implant, a bone augmentation was performed with autogenic bone or Bio-Oss (Bio-Oss, Geistlich Sons Ltd.) At the end of the implant placement procedure, the implants were covered with soft tissue, covered with a healing cap, or restored with an interim restoration. Definitive restorations were fabricated 3 to 6 months after implant insertion.
All included in the study implants were divided into 3 different implant placement methods: (Fig. 2)
1. The teeth were extracted and implants were placed immediately.
2. Implants were placed 6 to 8 weeks after tooth extraction.
3. Implants were placed 4 to 6 months after tooth extraction.
   (Typically for patients with sinus lift augmentation).

<table>
<thead>
<tr>
<th>Implant placement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1317 immediate implantation</td>
</tr>
<tr>
<td>310 delayed implantation (6-8 w)</td>
</tr>
<tr>
<td>61 late implantation (4-6 m)</td>
</tr>
</tbody>
</table>

Fig 2. Implant placement methods

3 types of loading were implemented: (Fig. 3)
1. Restorations were fabricated and delivered with the occlusal contacts on the placed implants.
2. Implants were loaded within 4 to 10 weeks.
3. Implants were loaded 3 to 6 months after implant placement.

<table>
<thead>
<tr>
<th>Loading protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td>1203 immediate</td>
</tr>
<tr>
<td>273 early (4-10 w)</td>
</tr>
<tr>
<td>212 delayed (3-6 m)</td>
</tr>
</tbody>
</table>

Fig 3. Loading methods

The average follow-up time was 107 months.

Results:
The cumulative implant survival rate was 95.6%, and the average bone loss was 2.03 mm. No statistically significant differences in bone loss among the different insertion and loading protocol groups.
In further statistical analysis was shown statistically significant effect of SPI implant showing less bone loss than DFI (P=.015), regardless of the insertion and loading protocol.

Conclusion:
Within the limitations of this study, the 3 implant insertion and loading protocols were found to have similar success rates for implant survival, but with marginal differences in bone loss that were not statistically significant. Further analysis of the study groups revealed that SPI types demonstrated less bone loss than DFI types, regardless of the insertion and loading protocol.

The full article:
www.ncbi.nlm.nih.gov/pubmed/26803177
Dental Implant Thread Design and the Consequences on Long-Term Marginal Bone Loss

Authors:
Ormianer Z., Matalon S., Block J., Kohen J.

Study device:
1. Alpha-Bio Tec DFI dental implants.
2. Alpha-Bio Tec Arrow dental implants.
3. Alpha-Bio Tec SPI dental implants.

Study Objective:
The aim of this study was to compare long-term bone loss around dental implants with 3 different thread designs. The 3 implant types studied are from the same company and have the same microstructured surface. Survival rates and average bone loss were evaluated.

Study design:
1361 implants were included in the study. The average follow-up time in this study was 107 months, with a minimum follow up time of 82 months. The implants were divided into 3 groups according to the implant type.

Results:
Overall survival rate was 96.3% with 50 implant failing (3.7%) out of 1361 implants. Survival rates for the 3 groups were: group SPI 96.6%, group DFI 95.9%, and in group Arrow 100%. Average bone loss for groups SPI, DFI, and Arrow were 2.02 (±1.70) mm, 2.10 (±1.73) mm, and 1.90 (±1.40) mm, respectively.
Average mesial-distal bone loss as measured from implant/abutment connection to bone level. The average bone loss was 2.02 (±1.70) mm for group A, 2.10 (±1.73) mm for group B, and 1.90 (±1.40) mm for group C.

Conclusion:
Favorable long term bone loss results were found in implants with a larger pitch, deeper apical threads, and a narrower implant core (SPI). One-piece V-thread design implants (Arrow) demonstrated 100% survival rate.

The full article:  
Ormaner Z., Matalon S., Block J., and Kohen J.; Dental Implant Thread Design and the Consequences on Long-Term Marginal Bone Loss.  
Implant Dentistry 2016:25 Number 4, 471-477  
www.ncbi.nlm.nih.gov/pubmed/27455430
Effect of repeated closures on opening torque values in seven abutment-implant systems

Authors:
Weiss EI., Kozak D., Gross MD.

Study device:
Morse tapered straight abutment.

Study Objective:
The purpose of this study was to compare torque loss as a result of multiple consecutive closures within and between systems.

Study design:
Seven Abutment/Implant systems were used to test changes in opening torque after multiple consecutive closures at a constant closing torque. All systems were closed in 20N/cm. After a resting period of 10 seconds, the abutment screw was opened and the opening torque recorded by a second operator. This procedure was repeated for 200 consecutive closing/opening cycles.

Fig 1. Schematic diagram represents sections of 7 abutment/implant assemblies showing interface and attached abutments. A, Spline; B, Steri-Oss external hex; C, Brånemark external hex; D, Omniloc internal octagon; E, ITI morse taper; F, Alpha-Bio. morse taper; G, Integral peripheral rim only.
Results:

A progressive decrease in opening torque values was measured in all implant systems. Significant differences were found between A/I systems. Systems with morse tapered and spline connections consistently maintained a higher resistance to opening force. Percentage torque loss ranged from 3% to 20% on immediate opening, and from 4.5% to 36% for average of first 30 opening/closing cycles.

Fig 3. Opening torque values after 200 consecutive repeated closures at 20 N/cm. Jagged lines depict mean opening torque of 3 samples for each of 7 A/I systems. (1) ITI, (2) Alpha-Bio, (3) Spline, (4) Integral, (5) Steri-Oss, (6) Omniloc, (7) Brånemark (seized at average of 32 closures). Solid smooth lines represent trend lines for data of 7 implant systems.

Conclusion:

Repeated opening and closing of implant abutment screws caused progressive loss of torque retention with variations between systems. This was probably due to a decrease in the coefficient of friction between the mating components. It is advisable to reduce the number of opening/closing cycles in clinical and laboratory procedures before final abutment closure to reduce the risk of screw loosening.

The full article:

Weiss EL, Kozak D., Gross MD.: Effect of repeated closures on opening torque values in seven abutment-implant systems 2000 J Prosthet Dent;84:194-9

www.ncbi.nlm.nih.gov/pubmed/10946337
Histological and radiological evaluation of sintered and non-sintered deproteinized bovine bone substitute materials in sinus augmentation procedures. A prospective, randomized-controlled, clinical multicenter study

Authors:
Fienitz T., Moses O., Klemm C., Happe A., Ferrari D., Kreppel M., Ormianer Z., Gal M., Rothamel D.

Study device:
1. Alpha Bio’s Graft® Natural Bovine Bone 1-2-mm, sintered bovine bone matrix (SBM), Alpha Bio, Petach Tikva, Israel
2. Alpha-Bio Tec SPI dental implants
3. BioOss® 1-2-mm, non-sintered bovine bone matrix (NSBM), Geistlich Biomaterials, Wolhusen, Switzerland - Control

Study Objective:
The aim of the present study was to compare two different xenogeneic materials, a sintered and a non-sintered bovine bone substitute material, in sinus augmentations using histological and radiological analysis.

Study design:
44 sinuses were allocated to the non-sintered or sintered group using a standard randomization protocol. Eleven bilateral and 22 unilateral sinuses in 33 patients were included in the study. Patients with bilateral sinus augmentations were treated in a split mouth design.
The study consisted of two surgical phases. In the first phase, the sinus augmentation was performed. In the second surgical phase, implant installation was performed following a healing period of 6 months and radiological control. Prior to implantation, a bone biopsy was taken. (Fig. 1)

33 patients (44 sinuses)

Non-Sintered - NSBM, Bio Oss® (Geistlich)  
Sintered bone - OLD ABT graft (Botiss)

Sinus lift  6 months  Implant installation

Fig 1. Study design
Histological evaluation was performed using a light microscope connected to a camera. Pristine bone and augmented bone areas were identified according to the presence of bone substitute material particles. The grafted area was defined as "area of interest" and used for histomorphometrical evaluation. For each augmentation site, the "area of interest" was evaluated using a quantitative colour analysis with special regard to the following parameters:

- Percentage of new bone matrix (NBM)
- Percentage of bone substitute material (BSM)
- Percentage of non-mineralized tissue (NMT)

Results:

Out of total enrolled subjects, 1 subject had left the study. In the present study, two different xenogeneic bone substitute materials were evaluated in external sinus floor elevation procedures. Although both materials differ significantly in terms of processing temperature, no significant differences were found in terms of volume stability and new bone formation, as well as remaining bone substitute material and non-mineralized tissue after six months of healing. No difference in the resorption rates of the tested bone substitute materials if same particle sizes are used. (Fig. 2)

Conclusion:

Sinus augmentations are a useful procedure to enable implant placement in the atrophic maxilla. Both examined xenogeneic bone substitute materials showed comparable results regarding new bone formation and height changes of the augmented sites and might be equally useful to support bone formation in the elevated sinus.

The full article:


www.ncbi.nlm.nih.gov/pubmed/27129584
Posters
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Narrow vs. standard implants in one-step flapless approach. One year follow-up.

Mostovei A., Topalo V., Chețe N., Sirbu D., Atamni F., Gumeniuc A., Moslovei M.
The State Medical and Pharmaceutical University "Nicolae Testemitanu"

Abstract
Numerous studies are published regarding the bone loss around narrow and wider diameter implants. Moreover, the effect of platform switching is also an intense discussed theme in the literature and the opinions about these two problems are divergent. Another factor which may influence the periimplant bone loss is the implant shoulder design. In some implants, due to constant platform dimensions, platform switching concept appears with the increasing of implant diameter. In order to achieve a correct opinion, it is necessary to appreciate the influence of implant diameter and the platform switching concept upon bone loss for each system separately.

Background and Aim
In case of one-step placement of two-piece dental implants, the early bone loss begins from the moment of implant insertion, whilst in the two-steps approach — after the second surgical step. In such situations, the flapless approach has a positive effect upon biological width formation. It is necessary to state the effect of implant diameter and platform switching upon crestal bone loss in case of one-step flapless placement of two-piece dental implants.

Aim
To appreciate the influence of the diameter of implants and the switch platform effect upon crestal bone modeling in case of one-step flapless placement of two-piece dental implants.

Methods and Materials
One hundred and twenty five Alpha-Bio TEC implants (SPI) were inserted in 69 patients (45±1.98 years) in the posterior sides of the mandible, using one-step flapless approach (with immediate connection of healing abutments). Seventy implants had the diameter of 3.3 and 3.75mm (Control) whilst the rest 56 implants - 4.2 and 5mm (Study Group, with the effect of platform switching). The socket preparation was initiated using spade bur, through the mucosa, without removing any part of it, and then the recommended surgical protocol was used (Figure 1). The integrity of the bone walls as well as the mucosal thickness at the top of the crest was checked with periodontal probes. The mean healing period was 13,0±1.03 (Control) and 13,0±1.03 (Study) weeks. At the end of the healing period the prosthetic evaluation was performed. One implant from control group failed during healing. According to the orthopantomogram, implants’ sides were divided into anterior and posterior ones. Due to the relation between bone crest and implant platform, three positions have been distinguished supracrestal, at the bone level and subcrestal. The following parameters were evaluated: primary and secondary stability (Periotest Classic), peri-implant bone modeling using Adobe Photoshop CS3 Program (at the end of the healing period and 1 year post-prosthetic). Statistical analysis was made by calculating mean values, standard errors, indices of Student’s paired t test and Mann-Whitney U tests.

Results
Primary stability was -6,18±0,116 (Study) and -5,91±0,106 (Control) while the secondary were -6,39±0,104 (Study) and -6,85±0,111 (Control) (p<0,05). In the Study Group, the periimplant bone loss at mesial and distal aspects were: 0.72±0.068mm and 0.48±0.056mm during healing period; 0.47±0.106mm and 0.37±0.082mm at 1 year follow up (p<0,05). In the Control Group, the periimplant bone loss at mesial and distal aspects were: 0.63±0.052mm and 0.48±0.047mm during period; 0.64±0.121mm and 0.54±0.219mm at 1 year follow up (p<0,05). The bone apposition has been observed around 2 Study and 10 Control implants (all in supracrestal position). There was no statistical difference between bone loss of both groups, neither during healing, nor 1 year post-prosthetic. A statistical difference has been observed between bone loss values of supracrestal implants position versus subcrestal ones (p=0,01 for mesial and p<0,05 for distal aspects) with lowest values in supracrestal position.

Conclusions
The implant diameter as well as the platform switching effect seems to have no influence upon periimplant bone level and implants’ stability during healing and 1 year post-prosthetic. The relation between the implant platform (microgap) and bone crest has a significant impact upon periimplant bone modeling, supracrestal position showing lowest bone loss values. The summary bone loss from the placement to 1 year follow up does not exceed values described in the literature for other implant types.

References
1. Mostovei A., Formarea spatiului biologic periimplantare in tehnica flapless in dependenta de tipul mucesei, Buletinul Academiei de Ştiinţe a Moldovei, 2013, 31(89–94), ISSN 1857-3011.

Fig 1 Flapless implant placement (SPI 4,2-13mm): preoperative view (a); after socket preparation (b); implant insertion (c); aspect of implant platform before healing abutment connection (d); healing abutment connection (e); primary stability appreciation (f); postoperative radiographic view (g); peri-implant mucosa at the end of healing period (h) and radiographic view (i); aspect of the prosthesis one-year after loading and radiographic view (J).
Intra-sinus bone evolution around implants placed using Flapless and graftless transcrestal sinus floor elevation: 5 years follow-up.

Topalo Valentin, Mostovei Andrei, Chele Nicolae, Atamni Fahim, Sirbu Dumitru
The State Medical and Pharmaceutical University „Niculai Testemitanu”

Results
The residual bone height on anterior and posterior sides consisted 7.88±0.778mm and 7.18±0.611mm. The degree of implant penetration into the sinus was 1.95±0.305mm and 2.08±0.433mm respectively. The bone clot after implant placement was 2.89±0.315mm and 3.01±0.438mm. During healing, a shrink of 0.84±0.36mm and 0.81±0.215mm occurred and an amount of 2.03±0.438mm and 2.18±0.425mm of new formed bone at the 2nd stage was observed. Five years post-prosthetic, the height of intra-sinus bone was: 2.2±0.454mm and 1.66±0.463mm. During this period, around 5 implants from anterior and 4 implants from posterior a shrink of 0.63±0.317mm and 0.73±0.250mm occurred, while the other ones showed a bone apposition of 1.27±0.04mm and 0.67±0.32mm. The crestal bone loss occurred between implant placement and 5 years post-prosthetic were 0.87±0.33mm from mesial and 0.92±0.382mm from distal aspects. The endo-sinus bone gain have a strong direct correlation with implant protruded height: mesial r=0.602 and distal r=0.886.

Conclusions
The implant placement by the described method leads to good and predictable results. During 5 years follow-up, the endo-sinus new formed bone remodeling manifested by a small shrink just for a part of implants, while other showed an increasing of bone height. A shrink less than 1mm in 5 years after prosthetic delivery demonstrates the possibility of avoiding grafting materials for transcrestal sinus floor elevations.

Abstract
The transcrestal sinus floor elevation during implants placement is a widely discussed theme in the literature. This study describes the results of 5 years follow-up of intrasinus and cortical periimplant bone modelling in case of transcrestal sinus floor elevation without bone condensation and grafting material.

Background and Aim
Implant placement using osteotome technique for sinus floor elevation is a widely used and discussed method. Usually, during surgery, grafting material is protruded in the preparation site in order to complete the space between sinus floor and the elevated membrane as well as to decrease the shrinkage of intra-sinus bone during years. There are studies which demonstrate good and predictable results without using bone grafting material. Moreover, a native bone can adapt and physiologically handle the functional loading regardless the grafted bony tissue. It is necessary to appreciate the integration process, endo sinus bone formation and its evolution around implants installed using flapless approach, without condensation and without grafting material.

Aim: To evaluate the intra-sinus bone evolution around implants installed using flapless transcrestal sinus floor elevation, without bone condensation and without grafting material during 5 years follow-up.

Methods and Materials
Five partially edentulous patients (mean age 41±1.37 years) received 10 two-stage dental implants (Alpha-Bio Toc, SPI, with diameter 3.75 to 5mm, and 8 to 11.5mm length) in posterior sides of upper jaw. The first surgical step was performed using flapless approach, using osteotomes for sinus floor fracture, without bone condensation and grafting material. All implants were installed in sites with D3 bone density (according to Misch). No perforation of the sinus membrane has been observed before implant insertion. According to orthopantomogram, implants sides were divided into anterior and posterior ones. Radiographic images were analyzed using Photoshop CS3 Program. The following indices were evaluated: residual bone height, the length of implant penetration into sinus, endo-sinus bone clot height, endo-sinus bone gain and evaluation of it during 5 years after prosthetic delivery. Crestal bone loss during this period was also evaluated. After a healing time of 6.3±0.42 months, the second stage was performed and prosthetic treatment was initiated after 2-4 weeks. All implants successfully integrated. The intra-sinus bone formation during healing and its evolution for a period of 5 years post-prosthetic were analyzed. Statistical analysis was made by calculating mean values and standard errors as well as Pearson’s Correlation test.

Fig.1. Radiographic aspects: preoperative (a); postoperative (b); at the end of healing (c); 5 years of after loading (d); intrasural aspect (e,f).

Fig.2. Radiographic aspects: preoperative (a); postoperative (b); at the end of healing (c); 3 years of after loading (d); 5 years of after loading (e):
Temperature changes in one-piece implants due to provisional restoration. The effect of implant diameter. An in vitro study

Ofer Moses, Shimshon Slutzki, Shlomo Matalon, Omer Cohen
Dep. of Periodontology & Dental Implantology, Dep. Of Prosthodontics
School of Dental Medicine, Tel Aviv University, Israel.

Background
Limited number of studies investigated heat production during provisional restoration of implant abutment. Exposure of osteoblast culture to 42 ºC induced activation of apoptosis mechanisms. To the best of our knowledge, heat production during provisional restoration of one-piece implants was never studied before.

Objectives
To evaluate changes in temperature of one-piece titanium implant surface during the setting of acrylic resin temporary crowns and to correlate thermal changes to implant diameter.

Methods and Materials
Thirty-three one-piece implants (ARRP, Alpha-Biotech, Israel) were divided into 3 groups according to diameter size (G1=3 mm, G2=3.3 mm, G3=3.6 mm). Implants were mounted on an acrylic glass apparatus. Thermocouples were positioned at the most coronal thread. Lower incisor temporary polycarbonate crowns were filled with 80 µL of self-curing acrylic resin and positioned immediately on the implant abutment. Thermal changes of the implant surface were recorded continuously for 10 minutes. Data were statistically analyzed using one-way analysis of variance.

Results
The mean initial temperature (C0) of groups G1, G2 and G3 was 337.81±0.77 ºC, 337.85±0.81 ºC and 337.80±0.77 ºC, respectively. The mean time to maximum temperature (Tmax) for groups G1, G2 and G3 were 337.38±42.91 seconds, 324.69±14.46 seconds and 317.98±37.91 seconds respectively (p<0.05). The mean thermal amplitude (ΔC) for groups G1, G2 and G3 was 6.75±1.02 ºC, 6.61±0.94 ºC, 6.65±1.26 ºC, respectively. The mean time to maximum temperature (Tmax) for groups G1, G2 and G3 were 337.38±42.91 seconds, 324.69±14.46 seconds and 317.98±37.91 seconds respectively (p<0.05). The mean final temperature (Cmax) recorded in groups: G1 (3.0 mm-implants), G2 (3.3 mm-implants), G3 (3.6 mm-implants). Data presented in Celsius degrees as mean value and standard deviation. * denotes p<0.05

Conclusions
Direct application of auto-polymerizing resin to the titanium abutment of one-piece implants significantly increased the cervical implant surface temperature. Implant diameter did not influence the temperature changes.

Clinical relevance
To avoid thermal injury to the surrounding bone it is recommended to constantly cool the implant with water spray during the setting of the provisional restoration.

References
Endo-sinus bone gain in case of lateral sinus floor elevation with immediate implant placement without grafting material.

Catalin Ion, Clea Nicolea, Topaie Valentin, Miculescu Andrei, Alaimi Fahim
The State Medical and Pharmaceutical University „Nicolae Testemitanu”

Topic: Implant therapy outcomes, surgical aspects

Abstract

The usage of grafting materials in sinus floor elevations through lateral access is considered a necessity for good and predictable results. Few studies only describe the possibility of using blood clot as grafting material. This study describes the preliminary results in case of implants placement with lateral sinus floor elevation without grafting material.

Background and Aim

Many studies describe the necessity of using grafting materials in case of lateral sinus floor elevations. Besides the advantages of it, an important role plays the autogenous bone which is often mixed with xenograft or synthetic materials in order to achieve a better quality tissue. However, these methods are often related to complications like sinusitis or failures. Several articles only described sinus floor elevation by lateral access and implants placement without grafting material.

Aim

To appreciate the endo-sinus bone gain in case of lateral sinus floor elevation with immediate implants placement without any grafting material.

Methods and Materials

The study was used on 5 patients (3 males and 2 females, mean age 38.23±11.2 years) who received 12 implants (Alpha Bio Tec, 3 patients with 2 implants and 2 with 3 implants) in posterior sides of upper jaw. The diameter of implants ranged between 3.75mm and 4.2mm while the length – 10mm and 11.5mm. The implants insertion was performed simultaneously with lateral sinus floor elevation using the trap door technique. Before implants insertion the sinus cavity formed after elevation were filled only with blood collected from peripheral vein. After suturing, plateled rich plasma was injected from buccal aspects. Sutures were removed after 10 days. Six months later, the second surgical step was performed, and the prothetic treatment was performed after another 4 weeks. Periimplant bone loss as well as endo-sinus bone gain during healing and 1 year postprosthetic has been evaluated. Statistical analysis was made by calculating mean values, standard errors and Pearson correlation test.

Results

All implants successfully integrated. Residual bone height from mesial and distal aspects was 5.95±0.4mm and 5.05±0.21mm, while the length of implants protruded into sinus were 5.81±0.35mm and 6.15±0.19mm respectively. At the end of healing period, the endo-sinus bone gain consisted 7.38±0.42mm (mesial) and 8.17±0.11mm (distal), but radiographically it had a lower opacity than the native one. One year post-prosthetic, the bone became mature with good corticalization of the new sinus floor, with dimensions of 5.93±0.56mm and 6.65±0.087mm from mesial and distal aspects. During this period, a shrink of 1.45±0.16mm and 1.51±0.19mm occurred. The cortical periimplant bone loss around implants from mesial and distal aspects was 0.23±0.006mm and 0.21±0.043mm during healing; 0.46±0.12mm and 0.68±0.27mm during 1 year postprosthetic. A strong correlation between implant protruded length and endo-sinus bone gain was observed 0.92 (mesial) and 0.682 (distal).

Conclusions

In appropriate conditions, the lateral sinus floor elevation without grafting material and with simultaneously implant placement lead to formation of an adequate amount of endo-sinus bone. By this way, it is possible to avoid the use of grafting materials. However, more studies and longer follow-up periods are necessary in order to appreciate the limits and indications of this method.

References

Fig. 1. Radiographic images: preoperative (a); postoperative (b); at the end of healing (c); 6 months postprosthetic (d); 1 year postprosthetic (e).

Fig. 2. Intraoperative view after elevation (a, b); grafting with blood (c); application of blood clot (d).

Add contact info: endoimplantco@gmail.com