Comitè Ètic d'Investigació Clínica

Straumann BLT CIR-ECL-2016-03
RESEARCH PROTOCOL

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Department: Oral and Maxillofacial Surgery
Research Line: Oral Invalidity

Research Title: Evaluation of marginal bone loss in Straumann® BLT implants in patients with posterior partial edentulism. A randomized clinical study comparing direct implant connection vs. intermediate abutment.

Introduction

Oral rehabilitation with dental implants after a tooth loss has become the most common and predictable treatment plan[1-5]. Nevertheless, the success of these implants in long-term will depend on the different clinical outcomes.

Only a minimal marginal bone loss is allowed in order to avoid inflammation in peri-implant tissues due to pathogenic microflora that may lead a progressive bone resorption[6].

Different etiologies have been described in literature for marginal bone loss. Inflammation from biomechanical stress due to an excessive occlusal loads[7] foreign-body reaction to cement around cemented-retained prosthesis[8], patient habits[8], prosthetic design[9] and surgical aspects, can influence the MBL at 1 year of loading[10].

It has also been reported in the literature that initial bone resorption is considered to be physiological[11] and it occurs after the functional loading[12, 13]. The establishment of biological width can explain this initial bone remodelling[14].

Regardless of the surgical technique (submerged or non-submerged), it has been widely described in the literature that the marginal bone crest level around two-piece dental implants, with screw-type implant–abutment connections, is generally located 1.5 to 2 mm below the implant–abutment connection.

Even if the etiological factors associated with early crestal bone loss have not been completely clarified, the main factors hypothesized to be involved in this bone remodelling process include, as it is commented before, surgical trauma, establishment of biological width depending on the abutment height and the presence, size and location of a micro gap between the implant and the abutment[15].

Morever, it is documented and demonstrated by Hermann et al, that significant amount of crestal bone loss occur around 2-piece implant designs depending on the location of the interface.

Hence, according to the above data, MBL around healthy implants can be attributed to the biologic width establishment or by inflammatory process induced by bacteria presence in the micro-gap around the crown-implant connection, regardless of the soft-tissue width.

The use of higher abutments to connect the crown to the implant would provide more space for soft-tissue adaptation and would diminish bacteria-promoted inflammation, reducing the bone resorption mediated by these mechanisms[16].

Purpose

The aim of this study is to determine the influence of prosthetic abutment vs not intermediate prosthetic abutment height on peri-implant marginal bone level change by comparing the volumetric changes in soft and hard tissues around Straumann Bone Level Tapered (BLT) implants using different abutment heights in partially edentulous patients in the posterior area.

Methodology

Ethical approval will be obtained from the International University of Catalonia Ethical Committee (Barcelona, Spain) and the study will be registered in the Service of the U.S. National Institutes of Health clinical trial Registry (www.clinicaltrials.gov).

Patient sample

Patients attending at the International University of Catalonia, School of Dentistry, requiring a posterior implant rehabilitation in order to replace maxillary and mandibular molars and premolars will be included in the study.

Sample size was calculated through ANOVA F test with an 80% of probability to detect statistically significant differences. As calculated by an online-based power calculation (35% standard deviation), the sample will consist of 60 implants (30 patients) and the sample will be divided in the following groups:

1. Control group (24 implants – 12 patients)
2. Test group (36 implants – 18 patients)

30 patients will be selected with partial edentulism in the maxilla or mandible, requiring two dental implants in the posterior areas (molars and premolars).

Each patient will be randomly allocated in one of the two groups: test group (n=36) or control group (n=24) and all the implants will be placed by residents of the International Master in Oral Surgery and Master in Periodontics of the same University.

Patients must fulfill the following criteria to be enrolled in the study.
Inclusion criteria:

1. Signed informed consent
2. Overall, healthy subjects
3. Females and males of at least eighteen-years
4. Requiring a minimum of two implants (molar and/or premolar teeth)
5. Adequate oral hygiene (less than 15% FMPS)
6. Able to follow instructions and attend a regular compliance
7. Enough bone to place a standard implant of 4.1 mm diameter.

Exclusion criteria:

1. Acute local infection
2. Occlusal overload with parafunctional activity (assessed clinically)
3. Large occlusal discrepancies
4. Untreated periodontal disease assessed by Socransky et al. parameters (≥2mm clinical attachment loss in two consecutive visits within 1 year)
5. Smokers (more than 10 cigarettes/day)
6. Drug and/or alcoholic dependencies
7. Medical conditions contraindicating implant surgery
8. History of head and/or neck radiation
9. Bisphosphonate therapy

Study design

A prospective randomized controlled clinical trial will be conducted. Study groups will be assigned as described above.

The patients will be randomly divided into two groups in order to study the influence of prosthetic screw abutment in marginal bone loss (MBL) around Bone Level Tapered implants

(BLT® Roxolid® SLActive® guided implants, Straumann Dental Implant System, Institut Straumann AG, Basel, Switzerland).

Randomization

The randomization sequence will be created by means of computer-generated randomization codes and concealed in sealed non-transparent consecutively numbered envelopes. The randomization envelopes were opened after preparation of the osteotomy sites by a designated study nurse in the presence of a witness (the surgeon). The sealed master randomization list will be provided by an external data management company.

Study groups

- Group 1: 2 stage approach (cover screw) (24 implants - 12 patients)
- Group 2: healing cap (over different height abutments) (36 implants - 18 patients)

Clinical procedures

Residents of the International Master in Oral Surgery and Master in Periodontics will perform surgical procedures and residents of the Master in Prosthodontics will perform the pre-surgical planification and final rehabilitation.

Surgical procedures will be reviewed and supervised by Ernest Lucas (E.L) as a responsible of the surgical part of the study and Prosthetic rehabilitation will be reviewed and supervised by Jose Espona (J.E) as a responsible of the prosthetic part of the study. Both (E.L and J.E) are secondary researchers of the present study.

All the included patients will sign an appropriate inform prior to any study-related actions.

Firstly, an intraoral digital impression with intraoral scanner will be taken and a diagnostic wax-up will be performed in order to obtain a surgical and radiological guide. Subsequently, a cone-beam computed tomography scan would be taken in the specific area to be treated.

With this pre-surgical plannification, fully guided and teeth-supported surgical stents (partial edentulous patients) will be used for every case and the implant position will be guided by the final prosthesis design, decreasing error probabilities in sequence drilling and standardizing implant placement protocol in all cases.
Soft tissue thickness will be measured pre-surgically in each patient, in order to randomize the patients to the different abutments height groups. Digital impressions and CBCT will be superimposed.

Intrasulcular and crestal incisions without releasing incisions and full thickness flap approach will be conducted in all patients. Bone drilling protocol and implant placement will be performed according to manufacturer instructions and recommendations (Straumann)

Insertion torque will be measured by iCHIROPRO (Bien-Air Surgical equipment) and afterwards, screw-retained abutments or healing abutments will be placed according to respective group.

Periapical x-ray has been described as the ideal technique to measure peri-implant MBL change, but the standardizition in the maxilla is challenging. Therefore, an individual silicone bite will be used for each patient.

After 2 months, second-stage surgery and healing caps will be placed in control group patients according to an early loading protocol. Impressions will be taken 2 weeks after the second-stage surgery for production of the final crowns.

In the test group patients, impressions will be taken 2 months after surgery over the definitive abutments. The final crowns will be delivered without changing the abutment thereby preventing any second surgery.

Clinical Parameters and Outcomes

- **Three-dimensional volumetric changes** in hard and soft tissues (Cone-beam computed tomography superposed with digital cast models)

  → To conduct the analysis of the bone remodelling in 3D images with Cone Beam Computed Tomography (CBCT), images will be acquired at 3 times:

  T1: Previous to implant insertion as a diagnostic exploration
  T2: Just after implant insertion
  T3: 6 months after definitive crowns placement

Currently, there are a lot of scanners on the market (Horner K, 2013), which differ with regard to their specifications, exposure settings, effective dosages and image quality. The diagnostic yield of different CBCT scanners is not necessarily the same; therefore, the results of research on a specific CBCT scanner(s) may not be transferable to another CBCT scanner.

The ALARA principle ("as low as reasonable achievable") has to be considered in all cases.

In comparison to conventional medical CT, the CBCT has been shown to have similar diagnostic performance for evaluating preoperative bone density (Aranyarachkul et al., 2005) and bone width measurement (Loubele et al., 2007). It has more accuracy for In comparison to conventional medical CT, the CBCT has been shown to have similar diagnostic performance for evaluating preoperative bone density (Aranyarachkul et al., 2005) and bone width measurement (Loubele et al., 2007). It has more accuracy for distance measurement (maximum error of 0.65 mm for CBCT vs. 1.11 mm for conventional CT) (Kobayashi et al., 2004), higher resolution in any direction for visualization of details of the small bony structures (Loubele et al., 2007), and 3–18 times less effective radiation exposure (Chau and Fung, 2009; Mah et al., 2003).

From this point of view, we can take advantage of the lower radiation of CBCT.

Data according radiation exposure:

- Intraoral radiograph: 1,5 microsieverts (Ludlow et al 2008)
- Panoramic radiograph: 2.7 – 24.3 microsievert (Ludlow et al 2008, Okano et al 2009, Garcia Silva et al 2008, Palomo et al 2008)
- Cephalometric radiograph: 6 microsievert (Okano et al 2009, Garcia Silva et al 2008, Loubele et al 2005, Faccioli et al 2009)
- CBCT unit type:
  1. Dentoalveolar from 18 to 70 microsieverts
  2. Craniofacial from 81 to 216 microsieverts (Theodorakou et al)

According to this data, we can take advantage of this dentoalveolar cbct, doing only a radiation exposure of the treated area, avoiding major radiations.

- ***Marginal bone level*** *(MBL) change:* Standardized intraoral periapical x-rays will be taken at the day of surgery, 4, 6, 12, 24 and 36 months following surgery. These will be used to measure the periimplant bone level by measuring from the implant platform to the first bone to implant contact. Measurements will be performed using Image J by one calibrated examiner. Implant threads will be used for normalization of the images.

  → T1: After implant insertion
  → T2: Crowns placement
  → T3: 6 months after crowns placement
  → T4: 12 months after crowns placement
  → T5: 24 months after crowns placement
  → T6: 36 months after crowns placement

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- ***Probing depth, bleeding on probing and keratinized mucosa width*** *will be measured in the follow-up visits* in 3 different buccal points (M, C and D)

  → T1: Crowns placement
  → T2: 6 months after crowns placement
  → T3: 12 months after crowns placement
  → T4: 24 months after crowns placement
  → T5: 36 months after crowns placement

VAS Scale: The visual analogue scale or visual analog scale (VAS) is a psychometric response scale which can be used in questionnaires. It is a

measurement instrument for subjective characteristics or attitudes that cannot be directly measured. When responding to a VAS item, respondents specify their level of agreement to a statement by indicating a position along a continuous line between two end-points. The VAS to be used will assess about satisfaction with speech, chewing function, hygiene, aesthetic satisfaction and overall satisfaction

→ T1: Crowns placement
→ T2: 12 months after crowns placement
→ T3: 24 months after crowns placement
→ T4: 36 months after crowns placement

Intraoral digital impressions

Intraoral digital impressions will be taken at 5 times:

- T1: Before surgery
- T2: After implant placement
- T3: Impressions for the prosthesis
- T4: After crowns placement
- T5: 6 months after crowns placement

Prescriptions

45-60 min prior to surgery each patient will receive loading dose of 2 gr amoxicillin.
Post-op, 875mg of amoxicillin/ 125mg clavulanic acid every 8 hours for seven days will be prescribed to all patients. In drug allergy cases, a loading dose of 600 mg clindamycin followed by 300 mg of every 8 hours will be prescribed. 400-800 mg of Ibuprofen every eight hours will be given as an analgesic drug.

Prosthetic phase

Once the implants are osseointegrated and the healing time for second stage surgery has been complete, at 8 weeks post implant placement, digital impressions will be taken in order to make the final screw retained prosthesis.

Provisional CAD/CAM PMMA restorations will be manufactured in Straumann milling Centre (Straumann, Germany) after 9 weeks of implant placement.

Implant scan bodies will be screwed to the definitive abutments that were previously placed and the digital impression will be taken. Color photographs will be taken at this point for adequate matching of the prosthesis color and the adjacent teeth.

The acquired data will be sent to the lab technician (Odontecnic, L'Hospitalet de Llobregat, Spain) that will process the STL file through DentalCAD Software and will design the metal framework. The design will be sent to the milling center (Straumann, Germany) and once the milling process is complete, the framework will be tried in.

Periapical X-rays will be taken and passive fit will be tested at this point to ensure an optimal fit. Inter-occlusal registrations will be also taken and calibrated to ensure proper ceramic support by the metal framework. The metal framework will be sent to the lab technician and they will perform the ceramic buildup. The bisque try-in will be placed at two weeks to check a correct occlusion, contact points and color of the prosthesis. The prosthesis will be sent again to the lab technician to perform the finishing, glazing and polishing of the prosthesis. After that, the definitive screwed prosthesis will be placed

Two weeks later, digital impressions, photographs, periapical X-rays, clinical probing depths and bleeding index, width of keratinized gingiva and VAS scale will be taken and measured.

Reasons for excluding the patient from the study:

- Patients who at some point failed with the inclusion criteria
- Loss of implant osseointegration
- Patients who do not come to follow-up visits
- Patients dissatisfied with esthetics due to exposure of the prosthetic interface (during the study period – 36 months)

Possible complications and solutions for the patient:

- Loss of implant osseointegration: The implant will be replaced free of charged in agreement with our study sponsor (Straumann)
- Patients dissatisfied with esthetics due to exposure of the prosthetic interface: The prosthetic interface would be changed free of charge in agreement with our study sponsor (Straumann) and the patient would be excluded of the study
- Biological problems (mucositis and periimplantitis): Patients would be treated according to the protocols of the University
- Prosthetic problems: Patients would be treated according to the protocols of the University

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Annexes:

a. Summary of the five most relevant articles used to prepare the protocol.

Crestal bone changes were not dependent on the surgical technique (submerged or non-submerged). ***J Periodontol 2000;71:1412-1424.***

Background: Today, implants are placed using both non-submerged and submerged approaches, and in 1- and 2-piece configurations. Previous work has demonstrated that peri-implant crestal bone reactions differ radi- ographically under such conditions and are dependent on a rough/smooth implant border in 1-piece implants and on the location of the interface (microgap) between the implant and abutment/restoration in 2-piece con- figurations. The purpose of this investigation was to examine histometrically crestal bone changes around unloaded non-submerged and submerged 1- and 2-piece titanium implants in a side-by-side comparison.

Methods: A total of 59 titanium implants were randomly placed in edentulous mandibular areas of 5 fox- hounds, forming 6 different implant subgroups (types A-F). In general, all implants had a relatively smooth, machined coronal portion as well as a rough, sandblasted and acid-etched (SLA) apical portion. Implant types A-C were placed in a non-submerged approach, while types D-F were inserted in a submerged fashion. Type A and B implants were 1-piece implants with the rough/smooth border (r/s) at the alveolar crest (type A) or 1.0 mm below (type B). Type C implants had an abutment placed at the time of surgery with the interface located at the bone crest level. In the submerged group, types D-F, the interface was located either at the bone crest level (type D), 1 mm above (type E), or 1 mm below (type F). Three months after implant placement, abutment connection was performed in the submerged implant groups. At 6 months, all animals were sacri- ficed. Non-decalcified histology was analyzed by evaluating peri-implant crestal bone levels.

Results: For types A and B, mean crestal bone levels were located adjacent (within 0.20 mm) to the rough/smooth border (r/s). For type C implants, the mean distance (± standard deviation) between the inter- face and the crestal bone level was 1.68 mm (± 0.19 mm) with an r/s border to first bone-to-implant contact (fBIC) of 0.39 mm (± 0.23 mm); for type D, 1.57 mm (± 0.22 mm) with an r/s border to fBIC of 0.28 mm (± 0.21 mm); for type E, 2.64 mm (± 0.24 mm) with an r/s

border to fBIC of 0.06 mm (± 0.27 mm); and for type F, 1.25 mm (± 0.40 mm) with an r/s border to fBIC of 0.89 mm (± 0.41 mm).

Conclusions: The location of a rough/smooth border on the surface of non-submerged 1-piece implants placed at the bone crest level or 1 mm below, respectively, determines the level of the fBIC. In all 2-piece implants, however, the location of the interface (microgap), when located at or below the alveolar crest, deter- mines the amount of crestal bone resorption. If the same interface is located 1 mm coronal to the alveolar crest, the fBIC is located at the r/s border. These findings, as evaluated by non-decalcified histology under unloaded conditions, demonstrate that crestal bone changes occur during the early phase of healing after implant placement. Furthermore, these changes are dependent on the surface characteristics of the implant and the presence/absence as well as the location of an interface (microgap).

Dimension of the periimplant mucosa. Biological width revisited. 1. J Clin Periodontol. 1996 Oct;23(10):971-3.

The objective of the present study was to determine the dimension of the mucosal-implant attachment at sites with insufficient width of the ridge mucosa. 5 beagle dogs were used. Extractions of all mandibular premolars were performed and 3 months later, 3 fixtures of the Branemark System were installed in each side. Following 3 months of healing, abutment connection was carried out. On the right or left side of the mandible, abutment connection was performed according to the Branemark System manual (control side). On the contralateral side (test side), an incision not extending through the periosteum was made at the crest of the ridge. The soft tissue was dissected and a critical amount of connective tissue on the inside of the flap was excised. The periosteum was subsequently incised, abutment connection performed, and the trimmed flaps sutured. The sutures were removed after 10 days. After a 6-month period of plaque control, the animals were sacrificed, biopsies sampled and processed for light microscopy. The length of the junctional epithelium varied within a rather narrow range; 2.1 mm

(control side) and 2.0 mm (test side). The height of the suprabony connective tissue in this model varied between 1.3+/-0.3 mm (test side) and 1.8+/-0.4 mm (control side). At sites where the ridge mucosa prior to abutment connection was made thin (< or = 2 mm), wound healing consistently included bone resorption. This implies that a certain minimum width of the periimplant mucosa may be required, and that bone resorption may take place to allow a stable soft tissue attachment to form.

Role of the microgap between implant and abutment: a retrospective histologic evaluation in monkeys. Journal of Periodontology 74: 346–352

BACKGROUND: It has been hypothesized that a certain width of the peri-implant mucosa is required to enable a proper epithelial-connective tissue attachment and, if this soft tissue dimension is not adequate, bone resorption will occur to ensure the establishment of attachment with an appropriate biological width. The reason for the accelerated bone loss around submerged 2-piece implants in the first year after the restoration is not known, but one possibility is that the gap between components plays a role in this process. Recent studies have shown that for all 2-part implants, the bone crest level changes appeared dependent on the location of the microgap.

METHODS: The aim of the present study was a retrospective histologic evaluation in monkeys of the bone response to implants inserted 1 to 2 mm above the alveolar crest (group 1, 15 implants), at the level of the alveolar crest (group 2, 12 implants), or 1 to 1.5 mm below the alveolar crest (group 3, 13 implants). These implants had been early loaded, immediately loaded, and inserted immediately postextraction.

RESULTS: In group 1, a 0.13 +/- 0.12 mm bone increase in a coronal direction was seen. In group 2, a 2.1 +/- 0.29 mm vertical bone loss was present. In group 3, a mean 3.6 +/- 0.46 mm vertical bone loss extending in an apical direction was observed. Statistically significant differences were observed between all 3 groups.

CONCLUSIONS: Our results confirm data published previously that if the microgap was moved coronally away from the alveolar crest, less bone loss would occur and if the microgap was moved apical to the alveolar crest, greater amounts of bone resorption were present. This remodeling is not dependent on early and immediate loading of the implants or on immediate postextraction insertion.

Abutment height influences the effect of platform switching on peri-implant marginal bone loss. Clin Oral Impl Res. 00: 1-7

PURPOSE: The purpose was to radiographically analyze and compare the marginal bone loss (MBL) between implants with different mismatching distance and to study the influence of the prosthetic abutment height on the MBL in association with the related mismatching distances.

MATERIAL AND METHODS: This retrospective study included 108 patients in whom 228 implants were placed, 180 with diameter of 4.5 mm and 48 with diameter of 5 mm. All patients received OsseoSpeed™ implants with internal tapered conical connection (Denstply Implants). Different mismatching distances were obtained, given that all implants were loaded with the same uni-abutment type (Lilac; Denstply Implants). Data were gathered on age, gender, bone substratum, smoking habits, previous history of periodontitis, and prosthetic features. MBL was analyzed radiographically at 6- and 18-months post-loading.

RESULTS: Mixed linear analysis of mesial and distal MBL values yielded significant effects of abutment, implant diameter, follow-up period, bone substratum, smoking, and abutment × time interaction. MBL was greater at 18 vs. 6 months, for short vs. long abutments, for grafted vs. pristine bone, for a heavier smoking habit, and for implants with a diameter of 5.0 vs. 4.5 mm.

CONCLUSION: Greater mismatching does not minimize the MBL; abutment height, smoking habit, and bone substratum may play a role in the MBL over the short- and medium term.

Biologic width around titanium implants. A physiologically formed and stable dimension over time. Clinical Oral Implants Research 11: 1–11

Research in implant dentistry has mainly focused on hard tissue integration with much less data available with regards to soft tissue integration involving epithelium and connective tissue. In the present study, the implantogingival junction of unloaded and loaded non-submerged titanium implants has been analyzed histometrically in the canine mandible. In 6 foxhounds, 69 implants were placed. Dogs in the unloaded group were sacrificed 3 months after implant placement. Loaded implants were restored with gold crowns and those dogs were sacrificed after 3 months and 12 months of loading. Non-decalcified histologic sections were analyzed histometrically measuring the dimensions of the Sulcus Depth (SD), the Junctional Epithelium (JE), and the Connective Tissue Contact (CTC). Histometric evaluation revealed that significant changes within tissue compartments (SD, JE, CTC) occurred over time ($P < 0.05$). Sulcus Depth had a mean of 0.49 mm and 0.50 mm after 3 months and 6 months of healing, but after 15 months was 0.16 mm which was significantly different. Similarly, the length of the Junctional Epithelium after 3 months and 6 months of healing was 1.16 mm and 1.44 mm, respectively, and these values were significantly different from measurements taken after 15 months (1.88 mm). The area of Connective Tissue Contact showed a different pattern of change in that after 3 months of healing (1.36 mm) it was significantly different from the same area after 6 months and 15

months which were 1.01 mm and 1.05 mm, respectively. Interestingly, the sum of SD, JE, and CTC, forming the Biologic Width, did not change over the observation period ($P > 0.05$). These data indicate that the Biologic Width is a physiologically formed and stable structure over time in

the case of non-submerged, one-piece titanium implants as evaluated histometrically under unloaded and loaded conditions. Dynamic changes did occur, however, within the overall Biologic Width dimension. Thus, the use of non-submerged, one-piece implants allow for stable overall peri-implant soft tissues as evaluated under loaded conditions for up to 12 months.

a. Data collection sheet

TIMELINE

CONTROL

Pre operatory	☐ Photography. ☐ Periapicals Xray. ☐ Digital impression. ☐ CBCT (1). ☐ Radiological splint. ☐ Surgical splint.
Surgery	☐ Photography. ☐ Periapicals Xray. ☐ Digital Impression. ☐ CBCT (2). ☐ ISQ (1).
Second surgery (8 Weeks)	☐ Photography. ☐ Periapicals Xray. ☐ Healing cap.
Provisional (9 Weeks)	☐ Photography. ☐ Periapicals Xray. ☐ Provisionals.
Impresion (10 Weeks)	☐ Photography. ☐ Periapicals Xray. ☐ Digital Impression. ☐ ISQ (2). ☐ Sent to the laboratory..
Metal test	☐ Photography. ☐ Periapicals Xray. ☐ Interoclusal registre to calibrate porcelain.
Biscuit test (2 Weeks after)	☐ Photography. ☐ Periapicals Xray. ☐ Evaluate color, interproximal and occlusal contacts.
Definitive crowns	☐ Photography. ☐ Periapicals Xray. ☐ Digital Impression. ☐ VAS (1). ☐ Probing pocket depht. ☐ Bleeding on probing. ☐ Keratinized measure.
4 Months	☐ Photography. ☐ Periapicals Xray.
6 Months	☐ Photography. ☐ Periapicals Xray. ☐ Digital Impression.

	☐ CBCT (3). ☐ Probing pocket depht. ☐ Bleeding on probing. ☐ Keratinized measure.
12 Months	☐ Photography. ☐ Periapicals Xray. ☐ VAS (2). ☐ Probing pocket depht. ☐ Bleeding on probing. ☐ Keratinized measure.
24 Months	☐ Photography. ☐ Periapicals Xray. ☐ VAS (3). ☐ Probing pocket depht. ☐ Bleeding on probing. ☐ Keratinized measure.
36 Months	☐ Photography. ☐ Periapicals Xray. ☐ VAS (4). ☐ Probing pocket depht. ☐ Bleeding on probing. ☐ Keratinized measure.

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TEST

Pre operatory	☐ Photography. ☐ Periapicals Xray. ☐ Digital impression. ☐ CBCT (1). ☐ Radiological splint. ☐ Surgical splint.
Surgery	☐ Photography. ☐ Periapicals Xray. ☐ Digital Impression. ☐ CBCT (2). ☐ ISQ (1).
Provisional (9 Weeks)	☐ Photography. ☐ Periapicals Xray. ☐ Provisionals.
Impresion (10 Weeks)	☐ Photography. ☐ Periapicals Xray. ☐ Digital Impression. ☐ ISQ (2). ☐ Sent to the laboratory..
Metal test	☐ Photography. ☐ Periapicals Xray. ☐ Interoclusal registre to calibrate porcelain.
Biscuit test (2 Weeks after)	☐ Photography. ☐ Periapicals Xray. ☐ Evaluate color, interproximal and occlusal contacts.
Definitive crowns	☐ Photography. ☐ Periapicals Xray. ☐ Digital Impression. ☐ VAS (1). ☐ Probing pocket depht. ☐ Bleeding on probing. ☐ Keratinized measure.
4 Months	☐ Photography. ☐ Periapicals Xray.
6 Months	☐ Photography. ☐ Periapicals Xray. ☐ Digital Impression. ☐ CBCT (3). ☐ Probing pocket depht. ☐ Bleeding on probing. ☐ Keratinized measure.
12 Months	☐ Photography. ☐ Periapicals Xray. ☐ VAS (2). ☐ Probing pocket depht.

	☐ Bleeding on probing. ☐ Keratinized measure.
24 Months	☐ Photography. ☐ Periapicals Xray. ☐ VAS (3). ☐ Probing pocket depht. ☐ Bleeding on probing. ☐ Keratinized measure.
36 Months	☐ Photography. ☐ Periapicals Xray. ☐ VAS (4). ☐ Probing pocket depht. ☐ Bleeding on probing. ☐ Keratinized measure.

Principal Investigator

Fdo: Dr./Dra. Jordi Gargallo-Albiol