The impact of immediate implant placement on alveolar ridge preservation techniques: preliminary results of a volumetric and radiological randomized controlled clinical trial

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Aim: Following the loss of a single tooth, severe hard- and soft-tissue alterations may take place within the affected site, resulting in a subsequent reduction of both vertical and horizontal ridge dimensions. Alveolar ridge preservation (ARP) techniques have been introduced, aiming to maintain the existing soft and hard tissue envelope as well as a stable ridge volume, simplifying subsequent treatment procedures and optimizing functional and esthetic outcomes. After these procedures a minimum of four to six months must be awaited before implant insertion can be performed. This in turn brings the patient compromised comfort, function and aesthetics and needing of a second surgical procedure for the implant placement. A surgical method aimed to reduce the number of dental appointments and surgeries is the implant insertion at the time of tooth extraction (type I or immediate placement). Nevertheless this surgical protocol does not provide predictable outcomes, since it may contribute towards a more pronounced bone resorption during healing. It is unknown if immediate implant placement plus grafting materials and/or barrier membranes could influence post-extraction dimensional changes of alveolar ridges. No consensus exists on the need for bone augmentation simultaneously with immediate implant placement. Furthermore, no human study has yet compared dimensional changes of both hard and soft tissues after two different treatments: an alveolar ridge preservation technique for a subsequent implant placement and an alveolar ridge preservation technique with an immediate implant placement.

Aim: To evaluate the volumetric and radiographic changes of the alveolar ridge 4 months after tooth extraction following three different surgical protocols: spontaneous healing, ridge preservation technique and immediate implant placement plus ridge preservation technique.

Methods: In each of 15 patients one single-rooted tooth was extracted and 3 treatment modalities were randomly assigned to the following groups (n = 5 each): a) immediate implant placement with demineralized bovine bone mineral with 10% collagen in the gap, covered with a collagen matrix (IMPL/DBBM-C/CM), b) demineralized bovine bone mineral with 10% collagen, covered with a collagen matrix (DBBM-C/CM), c) spontaneous healing (control)

Cone-beam computed tomography and impressions were obtained before extraction and 4 months later. Scans and digitalized casts were used to determine volumetric changes at the buccal hard and soft tissues.

Results: Four months after tooth extraction all groups revealed a vertical and horizontal changes of the buccal alveolar ridge and a horizontal volume change in the buccal soft tissue contour. IMPL/DBBM-C/CM group and DBBM-C/CM group reduced the amount of changes compared to spontaneous healing.

Conclusion: Both an alveolar ridge preservation technique and an immediate implant placement with simultaneous alveolar ridge preservation technique are able to reduce morphological changes after tooth extraction compared to spontaneous healing.

Conventional versus piezoelectric implant site preparation: resonance frequency analysis and torque insertion. A human cadaver study

**Aim:** Implant stability is a primary objective to be achieved to get the implant clinical success. Primary stability depends on several factors like bone density, implant morphology, surgical procedures. The aim of this study is to analyze two different site preparation techniques (Conventional and Piezoelectric) on fresh anatomical specimens and compare the values of insertion torque and RFA.

**Methods:** In our study thirty-six tapered titanium implants (Neoss Ltd., Mölnlycke, Sweden) with a diameter of Ø 4.0 and a length of 11 mm were fixed in nine human fresh cadaver mandibles. All the skulls selected had a fully or partial edentulous mandible with a sufficient bone height and width to receive 4 Ø x 11mm tapered implants. The two implant site preparation techniques were performed into two consequent sites. The conventional technique was performed using a surgical motor drill (ChiroproL, Bien-Air Dental SA, Biel/Bienne, Switzerland) and conventional burs according to manufacturer surgical protocol. The piezoelectric technique was made using Piezosurgery®touch (Mectron, Carasco, Italy) with the implant preparation kit pro. Implants were inserted with the same surgery motor drill. Whenever implant placement stopped, the insertion torque was increased by 5Ncm until full placement of the implants and maximum insertion torque value was recorded. Both techniques were performed by the same surgeon and RFA values had been registered blindly by two independent residents. RFA values were measured with PenguinRFA (Integration Diagnostics Sweden AB, Göteborg, Sweden). Four measurements in four direction for each implant fixture were made. The average of this measurements was calculated for each implant and result was showed in ISQ. A descriptive analysis was performed including the mean and standard deviations for insertion torque and implant stability . The results obtained in prepared sites with ultrasonic tips and burs kit were analyzed using STATA software.

**Results:** A total of 36 implants were placed into 9 cadaver mandibles for this study. For the implants placed following conventional technique (n=18) the average torque value was 41.1±14.3 Ncm and the average RFA value was 76.4±15.9 ISQ, whereas for the implants placed following piezoelectric preparation (n=18) the average torque value was 47.2±11.53 Ncm and the average RFA value was 74.4±9.84 ISQ. Comparing the torque values between piezo and traditional preparations (Fisher exact test α=0.05) there was not a statistically significant difference between the two groups (p = 0.7). Same result was obtained analyzing and comparing RFA values between the two groups (p = 1). Comparing the torque insertion values and RFA a statistically significant difference was found only in the traditional site preparation group ( = 0.05, p=0.015).

**Conclusion:** Our ex vivo data suggest that there is no difference in torque insertion values and in primary stability when tapered implants are placed performing conventional technique or piezoelectric technique. In our experience we have not found a close correlation between torque and RFA value. Findings of this study must be evaluated with caution because of some limitations.

**Health of peri-implant tissues and bone resorption in full-arch rehabilitations with immediate functional load**

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**Aim:** The purpose of this cross-sectional study was to evaluate plaque accumulation, peri-implant soft tissue inflammation and bone resorption next to immediately loaded implants in fixed full-arch rehabilitations.

**Methods:** Between September 2015 and July 2016 a sample of 72 patients (35 males, 37 females) was selected for this study at the time of the follow-up appointment for professional oral hygiene. The mean age of patients was 62.5 years (range: 35-90 years) at the time of the follow-up appointment. All the patients were rehabilitated with fixed full-arch rehabilitations supported by 4 to 6 immediately loaded implants (length ≥ 10 mm) following the Columbus Bridge Protocol (Tealdo et al. 2014) at the Division of Implant and Prosthetic Dentistry of Genoa University. The time elapsed from surgery had to be at least 4 months: the patients already had their definitive prostheses at the time of the follow-up appointment. The fixed prostheses were unscrewed and the following parameters were recorded: bleeding on probing (BOP) in four points for each implant using a non-metallic probe (values from 0 to 4) and plaque index (PI) using an erythrosine gel. Peri-implant bone level was evaluated radiographically. The implant-abutment interface was used as the reference point and interproximal bone level was measured from this reference to the most coronal bone at the mesial and distal side of each implant. Data were analysed using a nonparametric test (Spearman’s rank correlation). Correlation (rho) coefficients were defined as follows: 0.8 – 1.0 = very strong; 0.6 – 0.79 = strong; 0.4–0.59 = moderate; 0.2–0.39 = weak; and <0.2 = very weak.

**Results:** The mean follow-up for patients included in