The 2nd Baltic Osseointegration Academy and Lithuanian University of Health Sciences Consensus Conference 2019. Summary and Consensus Statements: Group II - Extraction Socket Preservation Methods and Dental Implant Placement Outcomes within Grafted Sockets

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ABSTRACT

Introduction: The task of Group II was to review and update the existing data concerning extraction socket preservation with or without membranes and soft tissue influence on post-extraction alveolar ridge preservation; extraction socket preservation using different biomaterials as bone grafts, growth factors, and stem cells. Special interest was paid to the dental implant placement outcomes within grafted sockets.
Material and Methods: The main areas evaluated by this group were as follows: quantitative and qualitative assessment of the effect of different alveolar preservation techniques performed immediately after tooth extraction, with or without membranes and/or soft tissue grafting, and the use of different bone substitutes, stem cells or growth factors in the postextraction socket. Evaluation of the treatment outcomes of dental implants placed in the grafted sockets in terms of primary and secondary outcomes were assessed. The systematic reviews and/or meta-analyses were registered in PROSPERO, an international prospective register of systematic reviews: http://www.crd.york.ac.uk/PROSPERO/. The literature in the corresponding areas of interest was screened and reported following the PRISMA guidelines (Preferred Reporting Item for Systematic Review and Meta-Analysis) Statement: http://www.prisma-statement.org/. Method of preparation of the systematic reviews, based on comprehensive search strategies, was discussed and standardized. The summary of the materials and methods employed by the authors in preparing the systematic reviews and/or meta-analyses is presented in the Preface chapter.
Results: The results and conclusions of the review process are presented in the respective papers. Three systematic reviews and one systematic review and meta-analysis were performed. The group′s general commentaries, consensus statements, clinical recommendations and implications for research are presented in this article.

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RESULTS

The following reviews were prepared for publication as a result of work of Group I:

1. Extraction Socket Preservation with or without Membranes, Soft Tissue Influence on Post-Extraction Alveolar Ridge Preservation: a Systematic Review (Faria-Almeida et al. [1])

General commentaries

Tooth extraction begins a sequence of biological changes, with intense resorption of the alveolar bone, invagination of the mucosa, just in the first weeks after. The quantity and extent of bone process changes are dependent on several factors, which in all of the situations leads to alveolar ridge reabsorption, in the three-dimensions of the space.
A wide variety of alveolar ridge preservation treatment modalities have been described in the last 20 years, trying to reduce the biological events of alveolar ridge reabsorption.
It´s still opened if there is any advantage of using a membrane or/and a soft tissue grafts in these procedures.
The limited number of clinical trials and randomized clinical trial in humans present in the literature as well the heterogeneity in terms of designs evaluation of the outcomes and follow-ups makes impossible to perform a meta-analysis.

Consensus statement

The use of a membrane seems to achieve less bone resorption after tooth extraction, when compared with blood clot or with the use of Deproteinized Bovine Bone alone. This statement is based on a limited number of studies, which outcomes were evaluated by CBCT, periapical X-ray, clinical, histological and histomorphometric analysis.
There is a lack of information concerning the advantage of using soft tissue graft. There were no studies comparing the soft tissue graft with a negative group in the alveolar preservation techniques.

Clinical recommendations

Socket preservation will reduce the amount of alveolar bone contraction after tooth extraction.
The use of membrane as a barrier element appears to reduce the biological bone resorption.
No clinical recommendation about the advantage of using soft tissue graft can be made.

Implications for research

New trials with more patients and longer follow-ups need to be performed in order to identify what specific techniques and/or material is better to decrease the reabsorption of the socket after tooth extraction.
More clinical trials with negative control (not used a membrane or a soft tissue graft) need to be performed.
Clinical trial and randomized clinical trial to understand when/how the soft tissues grafts influence at the socket preservation are needed.

2. The Influence of Different Grafting Materials on Alveolar Ridge Preservation: a Systematic Review (Majzoub et al. [2])

General commentaries

Alveolar ridge preservation (ARP) has been proved effective minimizing the post-extraction dimensional changes, especially when thin facial bone wall is present. This systematic review confirmed the outcomes of previous investigations demonstrating the beneficial effect of ARP. Nevertheless, the magnitude and dynamics of the alveolar ridge's dimensional changes subsequent to tooth extraction are dictated and influenced by a variety of systemic and local factors that could not be evaluated.
With regard to the resorption rate, similar outcomes between allogeneic, xenogeneic and alloplastic grafting materials were observed. Nevertheless, despite the minimal differences reported, the results of this review favoured the use of xenogeneic and allogeneic materials with slightly less resultant resorption.
Limitations of the present investigation involved the inclusion of multiple different grafting techniques and barrier membranes as well as the inability to evaluate the local and systemic factors known to play a role in the remodelling process. Similarly, the histologic and histomorphometric outcomes were not evaluated.

Consensus statement

The utilization of a bone grafting material for ARP reduces the resorption process occurring after tooth extraction.
Minimal differences in resorption rate were observed between allogeneic, xenogeneic and alloplastic grafting materials.

Clinical recommendations

ARP should be performed when aiming at diminishing the resorption process occurring after tooth extraction. Allogeneic, xenogeneic and alloplastic grafting materials seem to provide with similar result with regard to the post-extraction resorption process. Hence, the selection between these bone substitutes should be based on other parameters rather than their ability to diminish the dimensional changes.

Implications for research

Future investigations should focus on the influence of local and systemic variables affecting the post-extraction remodelling process as well as patient-reported outcomes.

3. Extraction Socket Preservation Using Growth Factors and Stem Cells: a Systematic Review (Pranskunas et al. [3])

General commentaries

There are many post-extraction alveolar ridge preservation procedures. However, there is no gold standard grafting material and still this is an open field for scientific research. It should also be noted that mesenchymal stem cells (MSCs), growth factors and other bioactive molecules, including platelet derived growth factor (PDGF), fibroblast growth factor (FGF), insulin-growth factor (IGF) and bone morphogenetic proteins (BMPs) were proposed to be used for bone regeneration. Moreover, around the use of bioactive molecules, a plethora of techniques have been developed in order to reduce the dosage of the drug while improving its timely delivery. However, it is still actual to evaluate the reported literature on the use of stem cells or growth factors for post-extraction treatment of the alveolar bone.

Consensus statement

Stem cells and growth factors usage for alveolar ridge preservation are promising for future daily clinical practice. However nowadays, these methods need to be standardized and based on more scientific data.

Clinical recommendations

The potential therapeutic efficacy of stem cells and growth factors are clearly found in the literature. However, the lack of standardization of these studies, using very different protocols and products, does not provide a rational evidence that advice us a clear recommendation for clinical use nowadays.

Implications for research

Recommendations for future studies should include the standardization of dose and delivery methods of growth factors and the selection process, donor area and processing and purification of MSCs as well as a specific effort into conducting comparable long term preclinical studies in the current topic.

4. Dental Implant Outcomes in Grafted Sockets: a Systematic Review and Meta-Analysis (Ramanauskaite et al. [4])

General commentaries

To limit post-extraction dimensional changes, alveolar ridge preservation therapies, which intend to preserve the ridge volume in the envelope existing at the time of extraction, have been proposed. These therapies were shown to result in significantly less vertical and horizontal contraction of the alveolar crest compared to the spontaneous healing. Until now, however, there has been limited evidence regarding the clinical outcomes of implants inserted following ridge preservation.

In this systematic review, the included clinical studies presented methodological differences in terms of the variables assessed to measure the outcomes, and the control groups (immediate implant placement vs. implants in the healed non-grafted sites).

Nevertheless, some conclusions have been drawn. In terms of survival rates, placing dental implants in previously grafted sockets is a predictable treatment option. Meta-analysis suggested that implants inserted into the previously grafted sockets showed lower marginal bone loss than the implants inserted into the non-grafted sites. As well, moment of implant placement (immediate implant placement vs delayed implant placement in grafted sockets) did not show influence in the marginal bone loss around implants.

Consensus statement

The survival rate of the implants inserted into the grafted sockets ranged from 95% to 100% after 1 to 4 years of follow-up.

Marginal bone loss was found to be significantly greater for the implants placed in the non-grafted healed sites than for those placed in the previously grafted sockets.

No difference, in terms of marginal bone loss, was detected between immediately inserted implants versus implants placed in previously grafted sockets.

Clinical recommendations

Ridge preservation should be performed after a dental extraction, particularly when considering dental implant placement. Patients should be aware of increased risks if it is not performed.
Marginal bone level loss is more likely to occur in non-grafted healed sites.
Immediately inserted implants and implants placed in previously grafted sockets exhibit comparable marginal bone level changes.

Implications for research

Further studies are needed to evaluate long-term clinical parameters of dental implants placed in grafted sockets, including biological complications as none of the included studies reported on peri-implant disease during follow-up.
Other objective quantitative methods must be considered in future studies to assess the peri-implant tissue changes that occur over time using different treatment approaches, in terms of the timing of grafting procedures and of implant placement.

DISCLOSURE STATEMENTS

All group members were asked to sign a Panel Member Agreement (PMA). This agreement requires individuals to maintain the highest level of integrity and avoid all actual, perceived, and potential conflicts of interest. The authors reported no conflicts of interest related to this study.

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