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Journal of

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What about biomaterials for alveolar ridge preservation?

Traditionally, autogenous bone, harvested from intraoral or extraoral sources, has been the gold standard grafting material in alveolar ridge preservation procedures.

Biphasic materials are alloplastic bone grafting materials that have been used in both medical and dental fields. Many of the papers on biphasic materials by various authors have found 42% mineralized tissue in their core samples, of which 18% was woven bone, 23% was newly formed lamellar bone and 1% was retained graft particles.

The proliferative phase is characterized by angiogenesis, collagen deposition and formation of granulation tissue. Angiogenesis, the growth of new blood capillaries from existing vessels inside the grafting material, is the key physiological process and is controlled by signals from proangiogenic molecules.

The use of biphasic material favors new bone formation and allows critical-size defects to heal without interfering in the regeneration process.

Dr. José Luis Calvo Guirado
Co-Editor

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The aim of the *Journal of Oral Science & Rehabilitation* is to promote rapid communication of scientific information between academia, industry and dental practitioners, thereby influencing the decision-making in clinical practice on an international level.

The *Journal of Oral Science & Rehabilitation* publishes original and high-quality research and clinical papers in the fields of periodontology, implant dentistry, prosthodontics and maxillofacial surgery. Priority is given to papers focusing on clinical techniques and with a direct impact on clinical decision-making and outcomes in the above-mentioned fields. Furthermore, book reviews, summaries and abstracts of scientific meetings are published in the journal.

Papers submitted to the *Journal of Oral Science & Rehabilitation* are subject to rigorous double-blind peer review. Papers are initially screened for relevance to the scope of the journal, as well as for scientific content and quality. Once accepted, the manuscript is sent to the relevant associate editors and reviewers of the journal for peer review. It is then returned to the author for revision and thereafter submitted for copy editing. The decision of the editor-in-chief is made after the review process and is considered final.

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Guided surgery for single-implant placement: A critical review

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Abstract

Objective

The objective of this review was to evaluate the scientific evidence on accuracy, as well as esthetic and clinical outcomes of single-tooth implants placed using computer-assisted, template-based surgery.

Case description

Electronic and manual literature searches of clinical studies published between January 2002 and May 2015 were carried out using specified indexing terms. Outcomes were accuracy, Pink Esthetic Score, and clinical outcomes (Implant and prosthetic survival rates, complications, and marginal bone loss).

Results

A total of 706 titles and abstracts were found during the electronic and manual searches, but 563 publications were excluded (inter-reviewer agreement $k = 0.78$). The full texts of the remaining 143 publications were evaluated. A total of 125 papers had to be excluded because they did not fulfill the inclusion criteria ($k = 0.99$). Three manuscripts were added from the reference lists of all of the selected articles. A total of 21 articles were thus selected that fulfilled the inclusion criteria of and quality assessment required for this critical review.

Conclusion

Despite the high accuracy and a cumulative survival rate of 100%, there is little evidence to support the hypothesis that there is a clinical advantage of computer-assisted, template-based implant placement over conventional treatment protocols for the placement of an implant-supported single-tooth restoration. Long-term randomized clinical trials are needed to confirm these preliminary results.

Keywords

Computer-assisted surgery, single-tooth replacement, guided surgery.

Introduction

Single-tooth replacement by means of osseointegrated dental implants may be considered a reliable treatment option for replacing missing teeth, following both immediate and early protocols.[1, 2] Periimplant soft-tissue esthetics represents one of the major aspect of implant success, particularly in the anterior maxilla, and it may be a main factor in the patient's decision on implant therapy, rather than a conventional fixed or removable dental prosthesis.[3] It is well established that sufficient bone volume and a favorable 3-D implant position are prerequisites for long-term functional and esthetic success.[3–5] However, alveolar bone resorption after tooth loss seems to be inevitable with both immediate and delayed implant placement[6] and loading.[7] Consequently, prosthetically guided implant positioning might be difficult to achieve.

In recent years, the growing interest in prosthetically guided implant placement, together with the option of fitting prostheses with immediate function, has led to the development of software that integrates the restorative treatment plan (computer-assisted) with minimally invasive (template-based) surgery,[8–12] along with reduced treatment time and postoperative discomfort.[12] Guided implant surgery using cone beam computed tomography (CBCT), virtual treatment planning software and stereolithographic surgical templates has undoubtedly been a major step toward achieving optimal 3-D implant positioning with respect to both anatomical and prosthetic parameters. Computer-assisted, template-based implant placement offers the potential for better predictability and flapless implant surgery, resulting in reduced intraoperative discomfort and postoperative morbidity.[12] It also shortens the overall surgery time.

After enthusiastic preliminary reports,[13, 14] some independent prospective studies[9, 10, 15–17] drew attention to the potential deviations of 3-D directions between virtual planning and the actual final position of the implant. This approach is technique-sensitive and perioperative complications have to be taken into account.

Although, in general, tooth-supported templates are more accurate than mucosa-supported ones,[8] the application of guided surgery to enhance single-tooth implant positioning and esthetic outcome has not been widely reported in the literature. Potential advantages of flapless implant placement in the esthetic zone may include reduced mucosal recession and maximum preservation of periimplant papillae.[5, 18, 19]

Computer-assisted, template-based implant placement may help clinicians to perform successful implant therapy avoiding elevation of large flaps or even eliminating flaps completely, causing less pain and discomfort to patients.[12] One might assume that, in the case of complex anatomy, as well as post-extraction implant placement, both patients and clinicians could benefit from computer-assisted, template-based surgery. In such advanced cases, correct estimation of the bone condition and the implant position, as well as precise drilling, according to the preoperative planning may be essential in ensuring the successful placement of an implant.

The aim of the present critical review was to evaluate the scientific literature regarding accuracy, esthetic, and clinical outcomes of single-tooth implants placed using computer-assisted, template-based surgery.

Materials and methods

The review was written according to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines (http://www.prisma-statement.org). The protocol of this systematic review was adapted to the PICO format (P = population/patients: patients who received single implants placed using guided surgery; I = intervention: single-implant placement using guided surgery; C = comparator/control: single-implant placement using a conventional free-hand approach; O = outcomes: accuracy, esthetics and implant survival rate).

Search strategy

An electronic literature search was carried out with the intention of collecting relevant information about the accuracy, clinical application and esthetic outcomes of single implants placed using computer-assisted, template-based surgery. The following electronic databases were consulted: PubMed database of the U.S. National Library of Medicine, Scopus scientific abstract and citation database and the Cochrane Library. In accordance with the AMSTAR (A Measurement Tool to Assess Systematic Reviews) checklist, the grey literature in the New York Academy of Medicine Grey Literature Report was screened in order to find possible unpublished works.