TOOTH TRANSFORMER

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Case Report

Tooth Transformer: A New Method to Prepare Sinus Lift Autologous Toothgrafts. Histologic and Histomorphometric Analyses of 4consecutive Clinical Cases

Elio Minetti[1]* Andrea Palermo[2] and Paolo Trisi[3]

[1]University of Bari "Aldo Moro" Private Practice, Milano, Italy

[2]University of Bari "Aldo Moro" Associate Professor College of Medicine and Dentistry Birmingham, EnglandPrivate Practice, Lecce, Italy

[3]Scientific Director, Biomaterial Clinical and Histological Research Association; Private Practice, Pescara, Italy

Abstract

Introduction

Human dentin matrix could be successfully used for bone grafting procedure. It was well known that dentin grafts could induce osteoblasts proliferation. An innovative preparation method, using the dedicated automated device Tooth Transformer, which is able to transform autologous teeth in suitable grafting material, has been recently introduced. The aim of the present paper is to analyze the histologic outcomes in four human consecutive cases in which autologous tooth graft materials, starting from the whole tooth of the patient, was used for sinus lift regeneration.

Results

The bone defects were completely filled by newly formed tissue after 4 months of healing. The histologic analysis revealed no inflammatory or infective reactions against tooth graft. Tooth granules were surrounded by newly formed bone. Some tooth granules were incorporated in the bone trabeculae and they appeared partially resorbed. This fact testified that tooth graft underwent remodeling processes just like the native bone.

Discussion

Results from the present histologic case series analysis revealed that tooth graft appeared well integrated in the regenerative tissue without any inflammatory or infective reaction. The tooth of the patient may be used as autologous regenerative materials avoiding any foreign graft material.

Introduction

The tooth grafting procedure has been introduced by Urist et al. more than 50 years ago, when they discovered the osteo induction potential of demineralized dentin matrix[1-2]. More recently, Bessho et al. demonstrated the presence of bone morphogenetic proteins (BMPs) in human dentin matrix. In particular, it was observed bone formation and osteoblasts presence in rat muscle after demineralized human dentin matrix graft [3].

It was clear that both bone and dentin matrix contained fundamental growth factors for bone regeneration. It represented an efficient reserve of BMPs, bioactive growth factors (GFs), such transforming growth factor-B (TGF-B), which are well known to be involved in bone repairing processes [4]. Some authors theorized that the demineralization process allows better bone augmentation than non-demineralized dentin [5].

***Corresponding Author:** Elio Minetti, University of Bari "Aldo Moro" Private Practice, Milano,DDS, Viale Pisa 10, 20146 Milano,Italy, Tel/Fax +390240444740; E-Mail: elio.minetti@gmail.com

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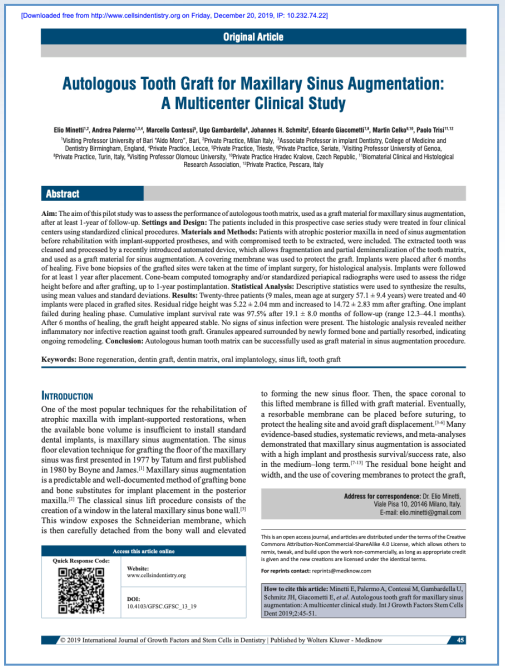
Results: Twenty-three patients (9 males, mean age at surgery 57.1 ± 9.4 years) were treated and 40 implants were placed in grafted sites. Residual ridge height was 5.22 ± 2.04 mm and increased to 14.72 ± 2.83mm after grafting. One implant failed during healing phase. Cumulative implant survival rate was 97.5% after 19.1 ± 8.0 months of follow-up (range 12.3–44.1 months). After 6 months of healing, the graft height appeared stable. No signs of sinus infection were present. The histologic analysis revealed neither inflammatory nor infective reaction against tooth graft. Granules appeared surrounded by newly formed bone and partially resorbed, indicating ongoing remodeling. **Conclusion:** Autologous human tooth matrix can be successfully used as graft material in sinus augmentation procedure.



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Original Article

Autologous Tooth Graft for Maxillary Sinus Augmentation: A Multicenter Clinical Study

Elio Minetti[1,2], Andrea Palermo[3,4], Marcello Contessi[5], Ugo Gambardella[6], Johannes H. Schmitz[7], Edoardo Giacometti[1,8], Martin Celko[9,10], Paolo Trisi[11,12]

[1]Visiting Professor University of Bari "Aldo Moro", Bari, [2]Private Practice, Milan Italy, [3]Associate Professor in Implant Dentistry, College of Medicine and Dentistry Birmingham, England, [4]Private Practice, Lecce, [5]Private Practice, Trieste, [6]Private Practice, Seriate, [7]Visiting Professor University of Genoa, [8]Private Practice, Turin, Italy, [9]Visiting Professor Olomouc University, [10]Private Practice Hradec Kralove, Czech Republic, [11]Biomaterial Clinical and Histological Research Association, [12]Private Practice, Pescara, Italy

Abstract

Aim: The aim of this pilot study was to assess the performance of autologous tooth matrix, used as a graft material for maxillary sinus augmentation, after at least 1-year of follow-up. **Settings and Design:** The patients included in this prospective case series study were treated in four clinical centers using standardized clinical procedures. **Materials and Methods:** Patients with atrophic posterior maxilla in need of sinus augmentation before rehabilitation with implant-supported prostheses, and with compromised teeth to be extracted, were included. The extracted tooth was cleaned and processed by a recently introduced automated device, which allows fragmentation and partial demineralization of the tooth matrix, and used as a graft material for sinus augmentation. A covering membrane was used to protect the graft. Implants were placed after 6 months of healing. Five bone biopsies of the grafted sites were taken at the time of implant surgery, for histological analysis. Implants were followed for at least 1 year after placement. Cone-beam computed tomography and/or standardized periapical radiographs were used to assess the ridge height before and after grafting, up to 1-year postimplantation. **Statistical Analysis:** Descriptive statistics were used to synthesize the results, using mean values and standard deviations. **Results:** Twenty-three patients (9 males, mean age at surgery 57.1 ± 9.4 years) were treated and 40 implants were placed in grafted sites. Residual ridge height was 5.22 ± 2.04 mm and increased to 14.72 ± 2.83 mm after grafting. One implant failed during healing phase. Cumulative implant survival rate was 97.5% after 19.1 ± 8.0 months of follow-up (range 12.3–44.1 months). After 6 months of healing, the graft height appeared stable. No signs of sinus infection were present. The histologic analysis revealed neither inflammatory nor infective reaction against tooth graft. Granules appeared surrounded by newly formed bone and partially resorbed, indicating ongoing remodeling. **Conclusion:** Autologous human tooth matrix can be successfully used as graft material in sinus augmentation procedure.

Keywords: Bone regeneration, dentin graft, dentin matrix, oral implantology, sinus lift, tooth graft

Introduction

One of the most popular techniques for the rehabilitation of atrophic maxilla with implant-supported restorations, when the available bone volume is insufficient to install standard dental implants, is maxillary sinus augmentation. The sinus floor elevation technique for grafting the floor of the maxillary sinus was first presented in 1977 by Tatum and first published in 1980 by Boyne and James.[1] Maxillary sinus augmentation is a predictable and well-documented method of grafting bone and bone substitutes for implant placement in the posterior maxilla.[2] The classical sinus lift procedure consists of the creation of a window in the lateral maxillary sinus bone wall.[3] This window exposes the Schneiderian membrane, which is then carefully detached from the bony wall and elevated to forming the new sinus floor. Then, the space coronal to this lifted membrane is filled with graft material. Eventually, a resorbable membrane can be placed before suturing, to protect the healing site and avoid graft displacement.[3,4] Many evidence-based studies, systematic reviews, and meta-analyses demonstrated that maxillary sinus augmentation is associated with a high implant and prosthesis survival/success rate, also in the medium–long term.[5-13] The residual bone height and width, and the use of covering membranes to protect the graft,

Address for correspondence: Dr. Elio Minetti, Viale Pisa 10, 20146 Milano, Italy. E-mail: elio.minetti@gmail.com

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