

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/sdj

Review

The use of 3D models to improve sinus augmentation outcomes – A case report



Selina H. Somji*, Agnetha Valladares, Sun Ho Kim, Yung Cheng Paul Yu,
Stuart J. Froum

Department of Periodontology and Implant Dentistry, New York University, Clinic 5W, 345 E 24th St, New York, NY
10010, USA

ARTICLE INFO

Keywords:

3D printed model
Implant surgery education
Surgical outcome
Cone Beam Computed Tomography

ABSTRACT

Sinus augmentation is a predictable procedure that is often required when restoring the posterior maxilla with dental implants. Even with high success rates, careful pre-surgical planning is crucial. A 3D model is a valuable aid for the clinician as it allows for pre-operative simulation, which can reduce surgical time, reduce the risk of intra-operative complications and decrease the potential for error. The aim of this case report is to focus on how such a model is useful when undertaking a sinus augmentation procedure with simultaneous implant placement.

© 2017 Published by Elsevier (Singapore) Pte Ltd.

Contents

Introduction	64
Case presentation	65
Discussion	66
3D-model	66
Flap design	67
Antrostomy	67
Posterior superior alveolar artery (PSAA)	67
Schneiderian membrane	67
Infection	68
Conclusion	68
Acknowledgment	70
Conflict of interest	70
References	70

*Corresponding author.

E-mail address: Shs494@nyu.edu (S.H. Somji).

Introduction

The posterior maxilla has traditionally been seen as a challenge when it comes to successfully placing dental implants. This is due to a combination of poor bone quality, ridge atrophy and pneumatization of the sinus floor following extraction. The sinus augmentation procedure, first introduced by Boyne and James in 1980 [1], is well documented in the literature as being a safe and reliable technique with highly predictable results [2]. Owing to good surgical outcomes reported in the literature, [3–5] sinus augmentation has gained more popularity with the dental profession and, due to the growing number of clinicians now placing implants, has become increasingly performed. The conventional approach includes preparation of a lateral window through which the sinus membrane is carefully elevated and the space created then filled with a bone graft material.

Although this procedure has a high rate of success, it is surgically challenging and presents various risks and complications [6]. To date, implantology is not a specialty recognized by the ADA in the United States. Moreover, initially only oral surgeons were the specialists who placed dental implants. Today, implant surgery is performed by clinicians with various degrees of surgical experience including general dentists, periodontists, prosthodontists, and endodontists [7]. The level of training dentists receive in this surgical field can vary significantly and it is likely that lack of formal training or inadequate training could lead to higher complication rates. Before performing a sinus augmentation procedure, clinicians should have a thorough knowledge of sinus anatomy, physiology, pathology, and surgical technique in order to avoid undesirable complications that may arise.

Careful pre-surgical planning is crucial and will reduce the incidence of complications. For years, the only pre-operative imaging prior to sinus augmentation were intra-oral periapical and panoramic radiographs. These, however, have their limitations and are not very accurate in showing anatomical variations and landmarks such as lateral wall thickness, disparity/unevenness of the sinus floor, blood vessels and septa. Moreover, sinus pathology is difficult to determine on these 2 dimensional radiographs. Cone Beam Computed Tomography (CBCT) provides greater detail and has become a commonly used diagnostic tool for implant treatment planning. Yet, it can still be challenging to convert the two-dimensional cross sectional images from CBCT into the three-dimensional quadrangular pyramidal structure of the maxillary sinus. For this purpose, 3D printing technology has been introduced in dentistry as a useful and cost effective tool for education and to improve surgical preparation [8]. Stereolithographic (SLA) models, introduced by Charles W. Hull in 1988 in the field of medicine, [9] can be fabricated using digital data from CBCT. More recent advances in digital technology have made 3D printing more accessible and more economical, solidifying its place in mainstream dentistry [10].

3D-printed models can be used to gain insight and become familiar with a patient's anatomy prior to surgical procedures. Furthermore, 3D models can be used for preoperative simulation of the surgical procedure itself, which is advantageous to the surgeon who will perform the procedure. Using

such models can aid in reducing surgical time, limiting the amount of soft tissue manipulation, familiarizing the surgeon with the patient's specific anatomy, reducing the risk of intra-operative complications and decreasing the potential for error [11].

The aim of this case report is to focus on how a pre-surgical 3D model can be a valuable aid for undertaking a sinus augmentation procedure with simultaneous implant placement.



Fig. 1 – Preoperative periapical radiograph showing insufficient height for implant placement in the maxillary left first molar edentulous site.

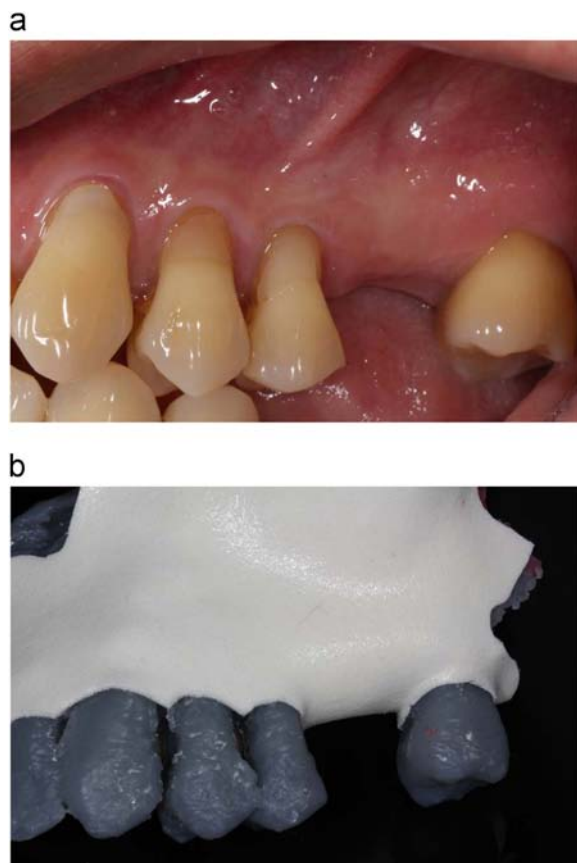


Fig. 2 – a. Preoperative lateral view of the edentulous site. b Simulated 3D model of the surgical site.

Download English Version:

<https://daneshyari.com/en/article/8768648>

Download Persian Version:

<https://daneshyari.com/article/8768648>

[Daneshyari.com](https://daneshyari.com)