



Dear Customer, Doctor, Dentist, Surgeon, Patient,...

Materialise wishes you a very happy 2004.

For the end of this year we would like to do more than just sending out Christmas and New Year cards to our customers and relations. Together with you we want to set up an action to the benefit of the children all over the world.

We aim at expressing our best wishes to you while supporting the United Nations Children's Fund (UNICEF) at the same time. As an alternative to mailing cards, we've designed a web page conveying our most sincere season's greetings to you:
<http://www.materialise.com/UNICEF>

If you also want to send us your best wishes by means of filling out the form on this web page, Materialise will donate the price of a postcard, worth 4 polio vaccines, directly to UNICEF.

We assure complete confidentiality of the given data.

Let's make this world a little better and healthier in 2004.

Thank you for assisting us in supporting UNICEF!

Best wishes,

The Materialise Medical team.

Yet another reason to use SimPlant

What makes SimPlant unique?

New from this edition of Headlines on, we will outline some of the reasons to use SimPlant that have proven their specific clinical benefits and are gathered from our users' feedback. You will also find interesting tips about the use of SimPlant and maybe discover un-explored features of the program!

Multiple Objects and 3D Editing

Processing sites make use of SimPlant Master to create SimPlant Planner files for their clients. SimPlant Master includes advanced 3D processing features that not only create 3D images, but also clean up artifacts and separate anatomical structures.

To obtain accurate 3D images from your dataset, the **Editing Module in SimPlant Master** performs a segmentation: this means that different parts can be selected, like the mandible, the maxilla, teeth roots, scan prosthesis, etc. From each selection a 3D can be calculated. A **SimPlant Master** with the **Editing Module** software can make a SimPlant project with multiple 3D objects and without artifacts! The same advanced editing features are available to the end-user in the new SimPlant Pro 8 software.

3D images generated by SimPlant Master help you to gain in-depth understanding of your patient's bony anatomy. SimPlant offers 3D visualisation of the implants, together with the bone, the scanned prosthesis or scanning guide, the nerve, and more.

In addition, SimPlant 8 allows for '3D image management'. The multiple 3Ds made by SimPlant Master can be saved in SimPlant Planner.

TIP



With SimPlant Planner you can create a 3D of the teeth! You just have to edit the threshold value: increase the HU (Hounsfield Unit) value from 250 to approx. 1400 for a maxilla or from 500 to approx. 1700 for a mandible.



Multiple 3Ds created using the advanced processing features of SimPlant Master with Editing Module (Fig.1) vs. the result of creating a 3D, without Editing Module (Fig.2).

For distortion-free and multiple 3D objects created from your dataset, contact your local SimPlant Master site to determine if they are using the Editing Module or contact Materialise for a list of sites.

The benefits of computer-guided implantology & SurgiGuides in treating patients with advanced alveolar bone resorption

Dr. Louie Al-Faraje, MD, DDS, AFAAID

Part One / In the mandible
Anatomic limitations and the restorative demands of patients' require that the surgeon gains high precision in the planning and surgical positioning of implants. The predictable transfer of endosseous implant simulation to the surgical site has now been reliably established, surgical procedures have been significantly shortened while assuring more predictable results. The purpose of this article is to show the benefits of computer guided treatment planning for patients with advanced alveolar bone resorption using SimPlant® software and prefabricated drill guides (SurgiGuides®) that are made from the CT data, resulting in accurate results.

Case Report

The patient was a healthy 60-year old man, who had become edentulous in both jaws due to periodontal deterioration (fig. 1).



Fig. 1: Preoperative panoramic X-ray

The patient desired a fixed implant supported prosthesis. A CT scan was taken with a prosthesis made with radiopaque teeth (Vivo Tac / Ortho Tac, Ivoclar, Vivadent) (fig. 2) to evaluate the relations of the ideal teeth positions to the patient's existing alveolar ridge.



Fig. 2: Radiopaque CT template

From the CT data of the mandible it was clear that the patient did not have enough bone volume for a fixed prosthesis (fig. 3). All fixed types of prosthesis required extensive bone grafting procedures that the patient did not want to have.



Fig. 3: The relation of the alveolar ridge to the ideal tooth #24 position

The second option was to see if the patient could have a fixed detachable (high-water) type prosthesis. It was decided to place implants for this type of prosthesis. Many factors play roles in planning such prosthesis: the patient's bone density, bone volume, age, sex, diet, A-P spread, parafunctions, crown-implant ratio and the nature of the

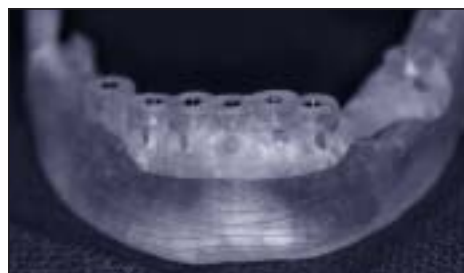


Fig. 4 & 5: SurgiGuides and the correct anatomic model

opposing arch. To minimise the effect of any force factors on the implants the surgeon should place as many implants as possible, as long and as wide as possible, in denser bony areas and should take advantage of the best surface technology available.

The treatment planning using SimPlant software optimizes the use of the existing alveolar bone. The software was used for planning and later bone-supported SurgiGuides (fig. 4 and 5) to transfer the planned positions of implants accurately to the actual surgical sites. It was possible to place successfully 7 implants (Replace® TiUnite® surface, NobelBiocare, Yorba Linda, California) (fig. 6) in otherwise very questionable locations



Fig. 6: The positions of the 7 planned implants



Fig. 7: Anatomic landmarks in proximity to the lower left implant

due to the anatomic limitations like the proximity of the inferior alveolar nerve, the sub-mandibular fossa (fig. 7) and the digastic fossa (fig. 8).

The left side implant is 4.3mm diameter and 10 mm long. All other implants are 3.5mm diameter and range from 10 to 13mm long.

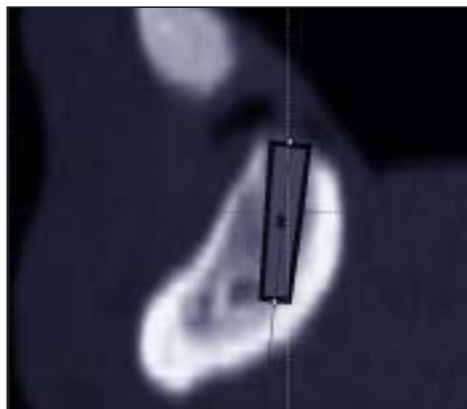


Fig. 8: The digastric fossa in relation to the central front implant

Planning tip

When planning the positions of front implants for fixed detachable or overdenture cases I simply measure the distance between the 2 mental foramina and then place 4 to 5 implants equally spaced in this distance. As for the back implants the goal is to place the implants as far as possible to maximize the A-P spread distance, a distance automatically calculated and visualised by SimPlant.

The final prosthesis

The patient continued to wear his temporary full denture prosthesis for the healing period of 4 months, after which the implants were uncovered, healing abutments were placed for 3 weeks and then the fabrication process of the prosthesis started. It is very important during the prosthesis fabrication to allow passive fit between the metal framework and the implants. This can be facilitated by using GoldAdapt® non-engaging abutments (fig. 9) (NobelBiocare, Yorba Linda, California). All implants were successfully osseointegrated as they were tested after the healing period. Finally the screw-retained prosthesis was tightened to the implants and the occlusion checked. (fig. 10-14)



Fig. 9: Non-engaging Gold-Adapt® abutments



Fig. 10: The bottom side of the final prosthesis



Fig. 11: The final prosthesis in place

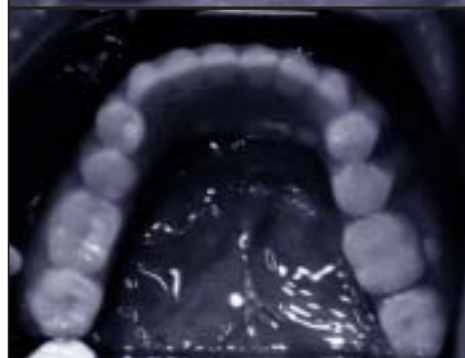


Fig. 13: View of the final prosthesis with the opposing dentures



Fig. 14: Final X-ray

Conclusion

The computer-guided planning and subsequent SurgiGuide templates allow the surgeon to:

- Place implants without risking any damages to vital anatomic structures
- Significantly shorten the surgery time
- Gain more precision & predictable results (by placing the implants in correct positioning and in denser bone areas)
- Use the most out of the existing bone volume (by placing as wide and as long implants as possible)
- Calculating important prosthetic values (like the A-P spread distance, moment and lateral force values and restorative parameters and much more).

The computer guided planning provides other important functions in different situations like for the maxilla as we will see in part II of this article in one of the next Materialise Headlines issues.

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SurgiGuides accuracy study - Request for feedback

The many case studies presented in Headlines have reported the major advantages of doing complete treatment planning with the SimPlant software. To extend these advantages many clinicians use SurgiGuides, patient specific drill guides, to boost the benefits of working with SimPlant. SurgiGuides allow the clinician to transfer the accurate SimPlant planning to the patient's mouth at the time of surgery.

How much more precise can the surgery that was planned with SimPlant, be performed with a SurgiGuide, compared to freehand 'mental' navigation?

Together with Materialise, Dr. Vrielinck (Genk, Belgium) is setting up a study to analyse the precision of implant treatment using CT image guided where the actual transfer of the planning towards the patient was performed with the use of SurgiGuides versus without drill guide. For this study we are looking for CT images and planning files of patients; we need the pre-operative as well as the post-operative scan - no matter if the scans are already some years old - in order to validate the transfer of the computer guided treatment planning.

If you can gather this kind of information and want to share it with our research team, please contact Nico Roose at +32 16 39 66 11 (Belgium) or Denise Logsdon (US): +1 443 557 0121 or e-mail us: simplant@materialise.be.

Thank you for your collaboration!

E V E N T S

For Europe

February 25-28

6th International Symposium on Computer Methods in Biomechanics and Biomedical Engineering
Madrid, Spain

March 25-27

Centerpulse Dental Summit 2004 Symposium
Sitges, Spain

April 5-9

Euro Expo Dental Paris
Paris, France

For the US

January 22-25, 2004

ICOI Winter Symposium
New Orleans, LA

January 28-31, 2004

Seattle Study Club Annual Symposium
Dana Point, CA

March 5-8, 2004

WCOI 6
Honolulu, HI

March 18-20, 2004

Academy of Osseointegration Annual Meeting
San Francisco, CA

FREE TRAINING SESSIONS EVERY MONTH !

Get the most out of your SimPlant software by attending a training session!

To jump-start your understanding of SimPlant, we are offering FREE training sessions. We will offer you a varied training programme starting with the installation of SimPlant on your computer and give a general overview of the software and the advanced features of SimPlant. Next we'll guide you in hands-on training. This is where you become more successful using SimPlant, so it can be comfortably integrated in your everyday work. An easy-to-understand format designed for every level of user.

Training sessions will be held at our office in Leuven, Belgium. For detailed information and to register for a free training session, complete the form below and fax it to your local Materialise office.

**REGISTRATION FORM - PLACES ARE LIMITED
FAX TO: +32 16 39 66 00**

Name

Address

Phone

Fax

E-mail

- Friday January 30, Materialise Belgium office, Leuven
- Friday February 27, Materialise Belgium office, Leuven
- Friday April 2, Materialise Belgium office, Leuven

If possible bring your own computer with you so we can assist you installing the software. Deadline for registration is 1 week prior to each session.

I will bring my own portable computer: Yes No



Coming Events

In 2004 Materialise will again be present globally at fairs and conferences, supporting them as a sponsor and an exhibitor. In addition, we will conduct our own educational courses for interested dental clinicians.

Here's your opportunity to gain knowledge of the cutting edge dental implant technology and to get that information from nationally and internationally respected leaders. We're bringing a world of knowledge to your doorstep... all year long!

We invite you to our

▶ **Pre-conference Workshop 'Computer Guided Implantology', Thursday March 25**, at the occasion of the [Centerpulse Dental Summit 2004 Symposium](#), Sitges, Spain, March 25-27.

▶ **Implant Planning and the Use of Stereolithographic Drill Guides, April 23-24**, Genk, Belgium.
Teaching Workshop with live surgery organised in collaboration with Dr. Luc Vrielinck, Ziekenhuis Oost-Limburg, Genk, Belgium.

▶ **Annual Symposium on Computer Guided Implantology and RP in Medicine, Friday & Saturday June 4-5**, Leuven, Belgium (preliminary dates)
Join our two days of education and technology, presented through lecture, clinician demonstrations and hands-on training.

Let our experienced specialists inspire and update you on the latest innovations in computer guided implantology! You will find more information about these events on our website www.materialise.com and in future Headlines.



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