Digital Workflow In Implant Dentistry: accuracy and predictable solutions.

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INTRODUCTION

Treatment with osseointegrated implants is a common and challenging practice in daily clinical practice. The success criteria are increasingly focused on aesthetic as well as functional aspects. Thus, there is a search for techniques and approaches that enable the exact three-dimensional positioning of the implant.

Correct implant positioning has clear advantages; favorable prosthetic and esthetic solutions, hard and soft tissue stability, proper hygiene, and potential for proper implant occlusion and loading. Due to the numerous requirements to achieve optimal positioning, virtual planning has become an important tool for treatment. And its transition to the clinic has been through the use of prototyped surgical guides.

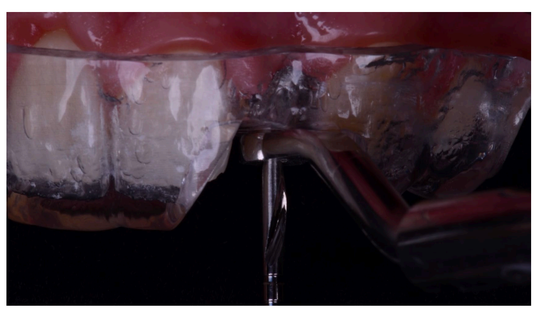
The prototyped guides, when computer-assisted, can be made by milling or printing, based on a model provided by the planning software. This system contains four parameters for the spatial positioning of each implant and depth information, which will guide the placement of the washers in the guides. Additional information on intended components, prosthetic outcomes and peri-implant architecture can also be considered and entered into the planning by the clinician in charge.

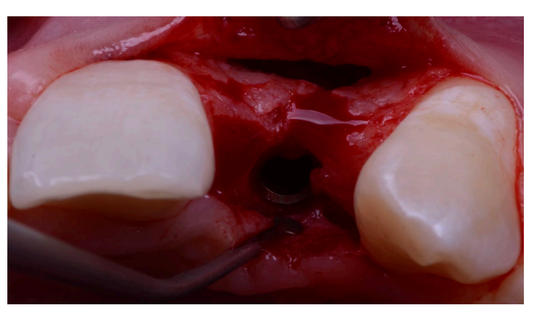
CLINICAL REPORT

A 19-year-old male patient attended the private clinic with mobility and incisal fractures of maxillary central incisors and avulsion of the upper left lateral incisor. The lateral incisor was lost and the buccal bone plate of the region in question was compromised.

The patient underwent clinical examination, complete anamnesis, cone-beam computed tomography, intraoral scanning and had favorable conditions for dental implant treatment.

METHODS & MATERIAL





Procedure

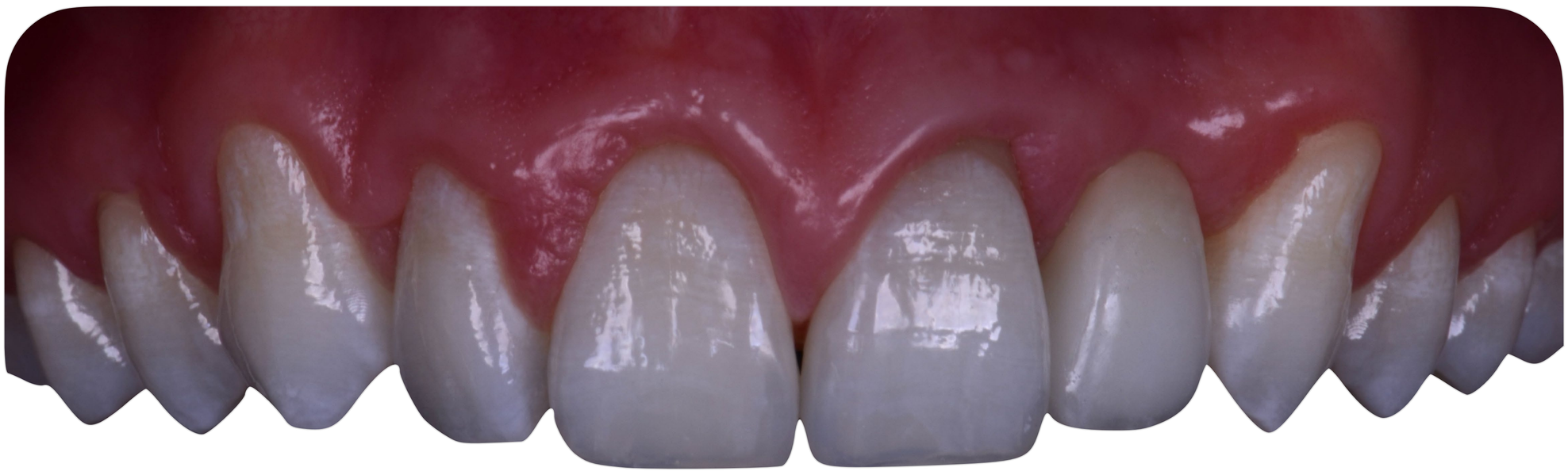
Surgery was performed with a palatally displaced incision, total detachment, milling using the ImplaGuide guided surgery kit (Implacil de Bortoli, Brazil) and dental implant installation (Maestro 3.5 x 11, Implacil de Bortoli, Brazil). To regenerate the lost bone plate, xenogenous bone graft (Extra-Graft 1g, Implacil de Bortoli, Brazil) was used. Suturing was performed for closure by first intention.

After the osseointegration period, reopening was performed associated with subepithelial connective tissue grafting, component installation (Pilar Ideale 3.3 x 4, Implacil de Bortoli), scanning (Cerec AC Omnicam, Dentsply Sirona), milling and installation of screw-retained provisional in the same session. Both procedures were performed under local anesthesia with Articaine 4% 1:100,000 (DFL, Brazil).

Respecting the soft tissue maturation time, the restorations were finalized and the definitive ceramic crown was installed.

Guide

The guide was planned using the available library of the Maestro implant (Implacil de Bortoli, Brazil) through Exocad Software (GmbH, Germany). Impression settings were programmed by Chitubox Software (Chitubox, China) for the Flashforge Hunter printer (Flashforge, China) and the resin of choice was DD Guide (Printax, Brazil).



CONCLUSION

With the ease of access to CT scanners, intraoral scanners and 3D printers, it has become feasible to transfer virtual planning to surgery. It is possible to predict and compensate the patient's anatomical limitations, as well as to maximize the prosthetic result. The results obtained have shown promise for improvements in daily surgical practice. However, potential deviation factors of surgical guides and their consequences still limit the absolute use and indication of guided surgeries.

REFERENCES

1. Ersoy, A. E., Turkyilmaz, I., Ozan, O. & McGlumphy, E. A. Reliability of Implant Placement With Stereolithographic Surgical Guides Generated From Computed Tomography: Clinical Data From 94 Implants. *J Periodontol* **79**, 1339–1345 (2008).
2. Cassetta, M., Mambro, A. D., Giansanti, M., Stefanelli, L. V. & Cavallini, C. The intrinsic error of a stereolithographic surgical template in implant guided surgery. *Int J Oral Max Surg* **42**, 264–275 (2013).
3. Tahmaseb, A., Wismeijer, D., Coucke, W. & Derksen, W. Computer Technology Applications in Surgical Implant Dentistry: A Systematic Review. *Int J Oral Maxillofac Implant* **29**, 25–42 (2014).
4. Bell, C., Sahl, E., Kim, Y. & Rice, D. Accuracy of Implants Placed with Surgical Guides: Thermoplastic Versus 3D Printed. *Int J Periodontics Restor Dent* **38**, 113–119 (2018).
5. Pyo, S.-W., Lim, Y.-J., Koo, K.-T. & Lee, J. Methods Used to Assess the 3D Accuracy of Dental Implant Positions in Computer-Guided Implant Placement: A Review. *J Clin Medicine* **8**, 54 (2019).

Presented at the 99th Annual Session of the Greater New York Dental Meeting in 2023.