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Simplification of 7 Implant Placement with Guided Surgery. Presentation of a Case

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Martínez-Ramos Yoban[1], Ortiz-Cruz Ana[2] and Yoshamin Abnoba Moreno-Vargas[3]*

[1]Faculty of Dentistry, Westhill University. Domingo García Ramos No 56, Cuajimalpa, Col. Prados de la Montaña, 05610 Mexico City, Mexico

[2]Faculty of Dentistry, National Autonomous University of Mexico, Circuito de la Investigación s/n, Ciudad Universitaria, Coyoacán, 04510, Mexico City, Mexico

[3]Department of Integral Oral Implantology, Westhill University, Domingo García Ramos Nº 56 Cuajimalpa Col. Prados de la Montaña, 05610 Ciudad de México, México

***Corresponding Author:** Yoshamin Abnoba Moreno-Vargas, Department of Integral Oral Implantology, Westhill University, Domingo García Ramos Nº56 Cuajimalpa Col. Prados de la Montaña, 05610 Ciudad de México, México.

Abstract

Introduction: Guided surgery is a technique that has evolved too much in recent years for improvement in the area of implantology with the aim of reproducing what is planned in the planning software and reducing the risk of poor positioning by offering the patient less invasive treatments in the surgical and prosthetic area.

Objective: To evaluate surgical times and reduce postoperative discomfort after dental implant placement, comparing it with the freehand technique in partially edentulous posterior areas.

Material and Methods: we present an adult female patient with an edentulous zone in the upper and lower posterior area for the placement of dental implants. The technique used was guided surgery.

Results: It was observed that the three-dimensional position of the implants placed by means of guided surgery reduces and decreases iatrogenesis, which can injure some anatomical risk areas such as the inferior dental nerve. It also helped the patient to have an easy postoperative recovery; It also led to a good clinical result since it helps to reduce surgical times by 70%, the placement of the implant was as planned, the insertion of the implants was obtained in the appropriate three-dimensional position, anatomical structures that were at risk were not compromised and the patient's postoperative discomfort was improved.

Conclusion: Guided surgery by means of a 3D printed guide is a procedure that allows the application of a highly precise, safe, effective and fast technique, whose surgery becomes more accurate by virtually visualizing the placement of implants.

Keywords: Guided surgery; dental implant; cad-cam system; tomography; guided bone regeneration; surgical guides; guided surgery; 3D design

Introduction

The surgical guide is a device used for the correct placement of implants, previously planned [1]. According to Gerling Widmann, who made a comparison of the conventional way, he mentions that the guided surgery technique is superior due to its potential to eliminate possible manual placement errors and that one of the main factors affecting the operation of the guide is the quality of the design and production of the guides. Surgery by means of surgical guides is expensive in terms of production, time and materials, the most commonly used type of printing in guided surgery is DLP: (Digital Light Processing) this type of printing uses a projector to show each layer that is being made; They are very fast, drying several layers at the same time [3, 4].

Therefore, by optimizing the production of surgical guides without compromising the quality of the surgical guide, it makes the clinic's workflow more efficient and accessible to both dentists and patients [4, 5].

Such surgical guides offer greater precision and significantly reduce the cost and time in treatment. In addition, they allow several areas of the jaw or jaw to be drilled for implant placement using the same guide. According to David Schneider, implants planned with surgical guides demonstrate high survival rates, between 91% and 100% [6].

Guided surgery does not provide greater accuracy than other methods, and if the steps previously established by the planning software are followed, the procedures are more predictable and accurate [8-10].

Paulo Malo mentions that the cumulative overall survival rate of implants at 1 year through guided surgery was 97.8%, with 97.2% and 100% in the maxilla and mandible [10]. It also mentions that minimal incisions are required due to their high precision that allows the placement of implants without exposing the bone that facilitates the postoperative period, sutures can also be avoided in most cases due to the less invasive gingival damage [11].

Preoperative planning of implant positions is an important part of surgical and prosthetic coordination, which is increasingly improved to obtain functional and aesthetic results [12].

Currently, dental implant therapy represents a very successful treatment option in dental clinical practice, after a systematic and oral evaluation of the patient, the correct treatment plan, surgical and prosthetic plan is determined, constituting a multidisciplinary vision of implant therapy, adding more and more solutions and tools to help clinicians make better selection decisions and achieve the most predictable oral rehabilitation, safe and consistent [11-13].

The results of the entire workflow, from planning to surgery, are reflected in the surgical guide, so its accuracy is an essential factor in assessing the success of rehabilitation and validating the remarkable accuracy of guided surgical systems. It is worth mentioning that the final outcome of rehabilitation depends on the evaluation of the survival rate of the implants used and the prosthetic outcome, which may reflect the reliability of these systems [14].

Case Report

Pre-surgical phase

A 69-year-old female patient, apparently healthy, in good general health; mandible and maxilla partially edentulous for approximately 4 years (Fig. 1a, 1b-1e).

Extraoral examination revealed an oval face, a broad forehead, high hair implantation, a centered midline, a deviated dental midline to the left, a marked nasolabial and nasolabial line, as well as a hypertonic chin (Fig. 1a).

On clinical examination, the patient was partially edentulous, upper and lower, wearing a removable prosthesis (Fig. 1b-1d). The main reason for his consultation was that he could not chew due to the lack of molars in the posterior sector (Fig. 1d).

Figure 1: Preparatory photographs: a) front of the patient who lent himself to be able to perform the guided surgery study, b) upper arch of the edentulous area to be worked on, c) lower arch of the edentulous area to be worked on and d) extraoral photograph of the front showing edentulous areas of the work niche. Direct Source.

Within the personal history, pathological and non-pathological, he does not present systemic disease that prevents and/or delays his dental treatment; A complete immunization schedule was also found, with no allergies or harmful habits for treatment.

Case planning

The treatment plan was established after an oral diagnosis was made, relying on diagnostic aids: medical history to begin to establish a diagnosis, taking clinical photographs, anatomical impressions with alginate, study models, assembly of these models, periapical x-rays, orthopantomography and computed tomography (Fig. 1,2,3). With these diagnostic aids, a comprehensive diagnosis was proposed, observing that the patient showed severe atrophy of the maxillary and mandibular bone, having a vestibular to palatal width of 5.0 mm, 11.5 mm height and in the lower area, 4.8 mm wide and 11.0 mm high from the inferior dental nerve to the bony crest. Once the patient was classified and diagnosed, a protocol for surgical planning was initiated.

After the evaluation by implantology specialists, it was decided to perform a guided surgery, since the level of atrophy of the maxillary and mandibular bone stopped us from placing implants on a regular basis for the reason that we could have a fenestration of the implant, fracture of the bone corticals or exposure of the implant cords. In this case, it was decided to do it with guided surgery because the placement of the implant had to be exactly the same as in the planning that was carried out in the software (Fig. 4). For this purpose, the system of the company Paltop was used.

It was decided to start with a flapless incision for the placement of dental implants, and then to carry out a future rehabilitation of the posterior sectors (Fig. 5c, 5d, 5f).

Figure 2: Initial orthopantomogram prior to treatment. Direct Source.

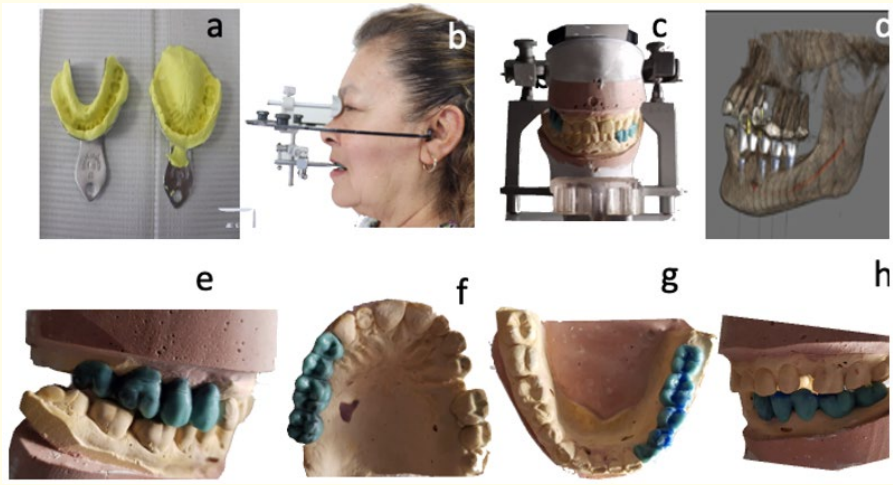

Figure 3: Photographs of laboratory work planning. a) Impressions with alginate b) Facial arch with whip mix 8500 articulator c) Articulated models d) Tomography in bluesky plan software e) Diagnostic wax-up, right lateral sup. f) Occlusal view of wax-up inf. g) Right Waxing Occlusal SUP h) Left Side Waxing Inf. Direct Source.

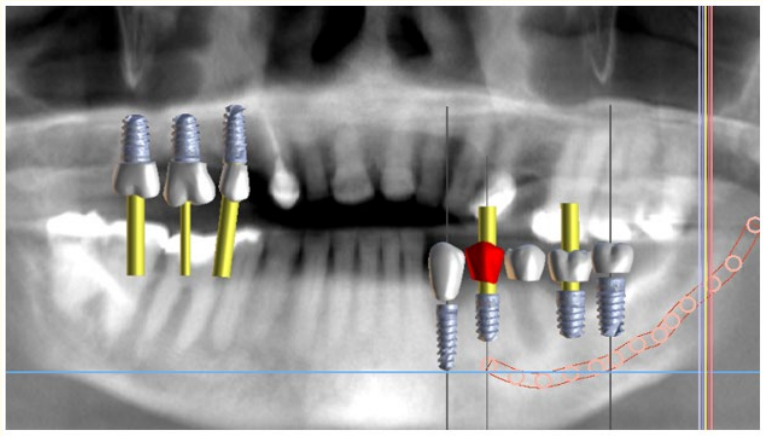

Figure 4: Surgical planning of implant placement with computed tomography (CT). Once the CT scan, scanning and virtual surgical planning have been carried out, the surgical template or guide is prepared. which was tested in Boca, verifying its settlement. Direct Source.

During the procedure, the surgical guide was placed on the patient to verify the correct position of the guide, it was checked that it had sufficient retention so that it was not dislodged at any time, since it is very important that it does not move through the exact position that we need to be able to place the implants (Fig. 5a, 5b and 5c). Once the location was secured and the perfect settlement was made, the area where the boarding had to be carried out was reviewed. By means of tissue punch, perforations were initiated to remove the soft tissue (Figs. 5d, 5e and 5f).

No surgical flap was performed, since the same drills pierce the mucosa and thus the placement of the 7 implants was performed, which were positioned in the edentulous mandible and maxilla. After the installation of the implants, they were tightened with a torque of 50 N, indicating that it has a fairly good primary stability. Locking screws were placed to submerge them and improve the osseointegration process.

During the surgical act there were no complications of what we had planned, we did not have the need to place graft in the areas of implant placement that are observed with less bone quantity, after the closure of the wound it was decided not to place healing screws to do them in a second phase.

At the end of the surgery, the implant insertion sites were sutured with isolated stitches and 3-0 Nylon suture, as shown in Fig. 5g, 5h.

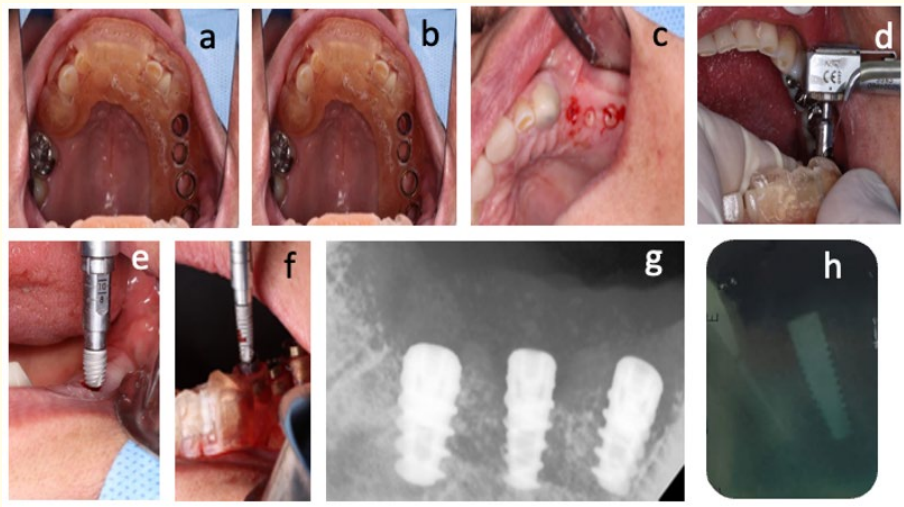

Figure 5: Photographs of surgical guide direct source a) seating of the surgical guide b) reduction cylinders c) drilling was performed d) finished drilling e) placement of the implant without guide, f) (flapless) and placement of implants g and h) periapical x-rays, to verify their position in the vertical direction and parallelism between the implants.

Results

The patient was placed a total of 7 regular platform Paltop implants with lengths ranging from 8 mm to 11.5 mm, vertically and without angulations. This was achieved with prior planning in the Bluesky Plan Software, following a prosthetic plan in the lost dental organs. To do this, a diagnostic wax-up was performed, which was scanned in order to make a printed guide and be able to perform the surgery accurately.

After the placement of the implants, we realized that the surgery was successful since the patient did not report any pain, bleeding or inflammation immediately after the surgery.

The patient was sent home with the following postoperative indications: Amoxicillin 500 mg/1 every 8 hours for 7 days was prescribed as a prophylactic antibiotic; Ibuprofen 400 mg for inflammation and paracetamol 500 mg for pain. A soft diet free of irritants was recommended, in addition to not using any type of temporary prosthesis.

During the monitoring carried out at 8, 15 and 30 days after implant placement, there was no evidence of concern that would affect the osseointegration of the implants (Fig. 6a, 6b). Subsequently, after 60 days, it was checked again and it was observed that the tissue was completely healed without problems or alarm data (Fig. 6c, 6d). Already at 90 days, a 100% scarred tissue with optimal osseointegration was observed; according to these results, it was decided to take an impression for the placement of the definitive prostheses (implant-supported metal-porcelain prostheses).

Finally, in the last check-up, the patient told us that she was satisfied with the treatment performed (Fig. 6e).

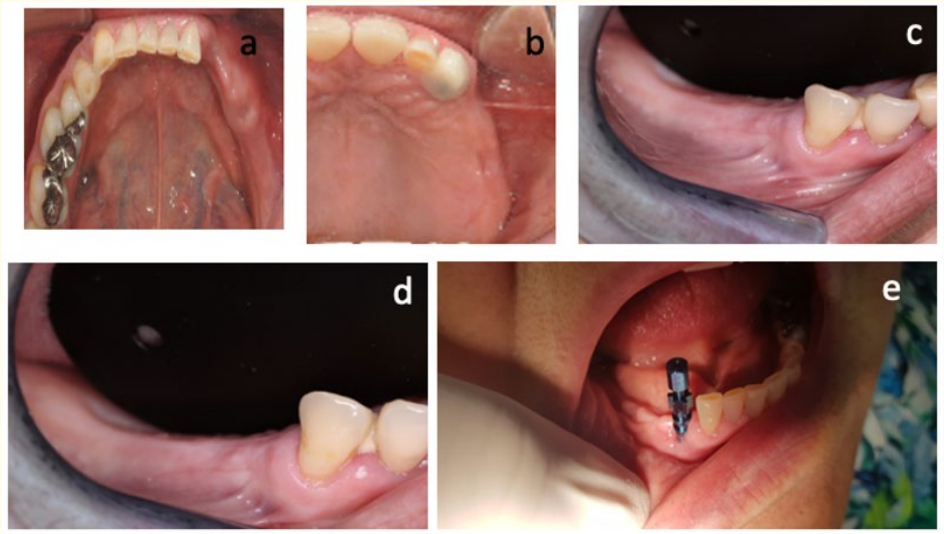

Figure 6: Direct source postoperative photograph a) 8 days after surgery. b) 15 days after surgery c) 30 days after surgery d) 90 days after surgery, e) impression pin placed for your next stage of rehabilitation. Direct Source.

Discussion

Guided surgical techniques based on classic predictability criteria have been widely used in implantology with the aim of reducing surgical morbidity and offering the patient a less invasive surgical/prosthetic treatment.

In the virtual planning of the patient, it was possible to evaluate and measure bone density; select the type, size and number of implants; verify their location, inclination and level of depth in relation to the bone; verify the possibility of bicorticalization of the implants; analyze the characteristics of the intermediaries and the emergence of the fixation screw of the future prosthesis; check the proper positioning of the rings in the surgical guide and the Ideal location of the fixing pins compared to similar studies carried out with the freehand technique. Therefore, it was observed that using the technique with surgical guidance is more effective and practical, since it reduces surgical times, postoperative times and results in a cleaner and safer surgery. Because virtual planning through software gives us more accuracy in our implant placement surgery [5, 6].

However, for the indication of guided surgery, the selection and preparation of the case are paramount [2]. The patient must have a good mouth opening, a sufficient amount of keratinized mucosa and adequate bone availability in height and thickness [13]. And in the case of exaggerated bone atrophy, the conventional technique without guidance is the best option to visualize the surgical bed and provide better treatment to patients.

Another point to consider is the poor reading of the CT scan and the lack of experience in the software that can alter the positioning of the guides and this could bring us serious problems at the time of surgery, an inaccurate production of the surgical guide and human error are the main errors that compromise the guided surgery technique [13].

Conclusion

The Guided Surgery technique for the placement of dental implants is precise when the protocol is correctly followed, which allows the insertion of the implants in a minimally invasive way, without the need for a flap, which simplifies the treatment and benefits the patient, because it avoids painful discomfort.

By knowing the anatomical structures involved in the area to be treated, surgical complications are avoided, this favors good planning, faster surgical times and fewer trans and postoperative problems.

The placement of implants by means of the freehand technique has its advantages; however, the technique with guided surgery ensures a greater clinical result, although it requires greater effort and investment, since with this technique risks and errors are reduced and the success and durability of the treatments is ensured.

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