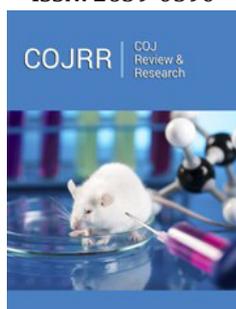


Replace Select® Tilted Implants Tapered Nobel Biocare with TiUnite® Ad Modum ALL-on-4 Surface: Surgical-Prosthetic Modifications of Totally Edentulous Patients in Upper and Lower Maxillae: Retrospective Multi-Center Study of a Series of 29 Cases

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Introduction

The immediate load prosthesis supported by implants is widely documented by several authors in international literature both for the maxilla and the jaw [1-3]. Current techniques for implant placement use minimally invasive or flapless surgery [4]. A better clinical evolution in scarring times, minimal inflammation, and decrease of surgical trauma on patients has been demonstrated. This type of treatment offers considerable advantages on patient therapeutics providing:

- immediate function and esthetics,
- cost reduction,
- less surgical interventions,
- improved quality of life and immediate resumption of regular activities.

There are surgical anatomical considerations in implant placement either on the atrophic maxilla and/or jaw, e.e.: nasal cavities on the maxilla and maxillary sinus, and the lower dental nerve and the mental nerve on the jaw to mention a few. This can modify the diagnostic and treatment plan resulting in graft placement, elevation of the sinus membrane, lateralization of the lower alveolar nerve, and replacement of the mental nerve [5].

Objective

The purpose of this article is to make known surgical-prosthetic modifications for placement and rehabilitation of tilted implants with TiUnite® surface on totally edentulous jaws and maxillas as well as its results regarding efficacy in a series of cases in Mexico and Colombia by means of a retrospective study.

Materials and Methods

The study included 29 totally edentulous patients on maxilla (No. Cases) and jaw (No. Cases) who were subjected to fixed total prosthesis placement supported by 4 Replace Select® Tapered Nobel biocare™ implants with TiUnite™ surface (Tables 1 & 2), 2 vertical anterior and two tilted posterior (120 implants).

Table 1: Cases of implants placed in Mexico.

Maxilla	# of Implants	Length	Sex	Age Range
Superior (14)	54	13(52) - 10(2)	F (12) M (2)	36-74
Inferior (4)	16	13 (16) - 10(0)	F (3) M (1)	52-74

Table 2: Cases of implants placed in Colombia. (Follow-up time in Colombia, 2 years 5 months).

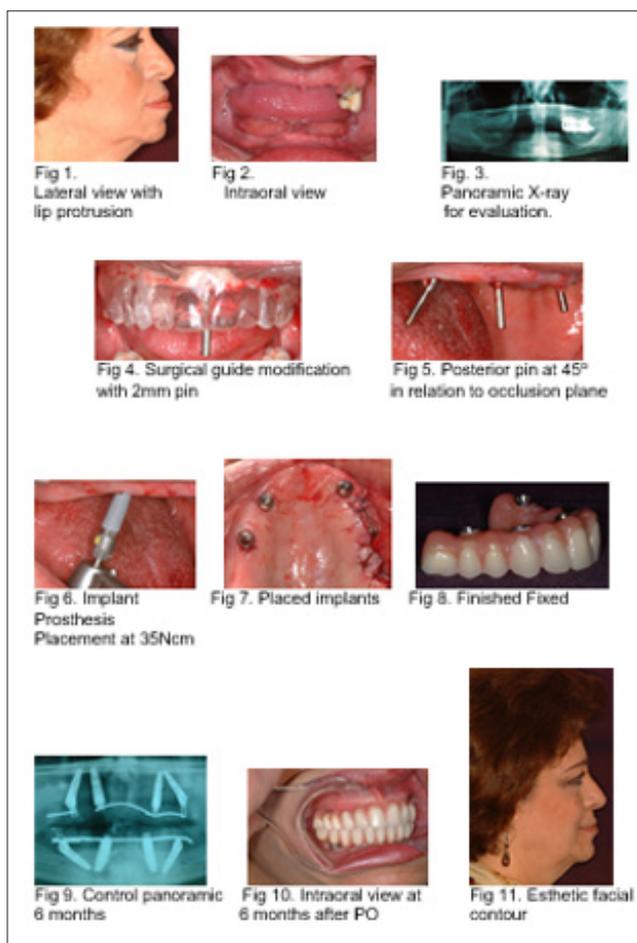
Maxilla	# of Implants	Length	Sex	Age Range
Superior (2)	8	13(6) - 16(2)	F (2)	45- 67
Inferior (10)	40	13 (28) - 10(12)	F (7) -M (3)	34-72

Surgical protocol

All patients were medicated with Clindamicine 300mg V.O Dalacin C®, beginning one day before the surgery, every 8hrs, and continuing the treatment for 7 days, Ketorolaco 10mg VO Dolac®, beginning with 2 tablets one hour before the surgical procedure and

1 or 2 tablets every 6 hours for 3 to 5 days afterwards; Clorhexidine 0.2% Bexident® oral rinses every 12 hrs for 10 days, in addition to Celestote 8mg I.V / IM trans surgical application and another dose 8 hrs after the procedure.

The protocol uses a surgical guide to position 2 anterior implants on the canine region and perpendicular to the occlusion plane, and 2 posterior implants at the 2° premolar level, distally tilted 30-40° in relation to the occlusion plane; anterior and parallel to the anterior wall of the maxillary sinus and anterior and parallel to the mental nerve rotation on the mental foramen, that are assessed by means of an intra-oral evaluation and an orthopantomography [6] (Case 1).



Case 1: Mexico.

The surgical guide designed by Dr. Paulo Maló is a titanium band shaped to follow the center of the occlusion line [7] over the jaw's and/or maxilla's shape. The modification presented in this article is by means of an acetate or acrylic replica of the patient's complete denture where 2 posterior orifices are made at the second premolar level at 45°, two anterior orifices perpendicular to the median sagittal plane in the canine region, and a 2mm diameter orifice on the median line which will be used as support during surgery with a 2mm diameter parallelism pin (Case 1).

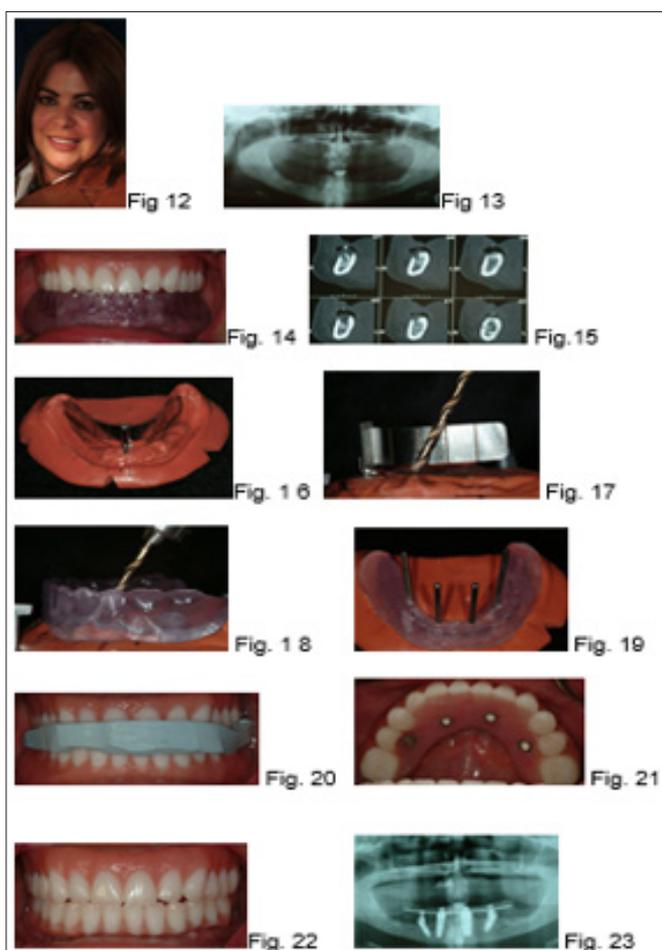
Infiltrative anesthesia was performed on the anterior alveolar nerve, median, nasopalatine, and posterior palatine with 2% lidocaine and 1:100,000 epinephrine on maxilla and inferior alveolar and bilateral mental. Later, the surgical guide was placed as well as the 2.0mm central stabilization pin. Conventional drilling was performed on the median line for a 4.3mm implant and the first 2 flapless implants were placed in the anterior region. The surgical guide itself is designed with a tilt for posterior implant placement at 45°. (Case 1) and the prosthesis and placement thereof have satisfactory functional and esthetic results (Case 1).

Prosthetic protocol

The diagnostic phase was initiated with a panoramic x-ray (Case 2) with preliminary impressions of edentulous maxillae in alginate. After, individual spoons were made to obtain definitive impressions using the two-step selective pressure technique with polyether described by Smith and collaborators⁸. Using self-polymerizing acrylic, base plates and rodets were made to obtain a record of the facial arch, determination of the vertical dimension, a record of centric relation, and a selection of acrylic teeth reinforced with high-resistance acrylic.

Next, mounting was performed on the articulator to create

enfilados of the two maxillae which were later evaluated in mouth and with the patients approval in relation to occlusion and esthetics we proceeded to duplicate the prostheses in transparent self-polymerizing acrylic using Duplicator Alfinat from Lang house (Case 2). We proceeded to make a soft silicone model over the duplicated prosthesis and then placed markers on the gutapercha to determine the possible position of the implants and ordered a Computerized Axial Tomography (CAT) with radio-opaque markers (Case 2). After, implant position was modified on the guide as necessary using the CAT's results and with the help of a metallic guide designed by Dr. Malo exact implant position was determined. Guides were disinfected in 2% gluteraldehyde for 1 hour (Case 2).



Case 2: Colombia.

Definitive prostheses were processed in high impact thermocured acrylic (Lucitone 199) and after final finish they were adjusted in mouth in relation to occlusion and esthetics. We proceeded to make a bite record in putty silicone in order accurately and intraorally position the guide and generate markings with methylene blue on soft tissue (Case 2). After having placed the implants and multi-unit angled pillars in the posterior implants and multi-unit straight pillars in the anterior implants, we proceeded to place the antagonist prosthesis and the silicone bite record previously made. On the noble part of the prosthesis that is fixed

to the implants, a bite record is taken that registers pillar position in relation to the prosthesis in order to make the perforations that will allow placement of temporary titanium cylinders on the multiunit pillars which will be fixed to the prosthesis by means of a self-polymerizing acrylic. Later, the implanted prosthesis was reinforced with flat forged steel to increase fracture resistance [8]. Finally, occlusion is adjusted, contours are modified to provide access for an adequate hygiene and the prosthesis is screwed to the pillars generating 15ncm torque on the screws and sealing is performed with resin (Case 2).

Result

Out of 29 patients (100%) a total of 120 implants were placed: (100%) Replace Select® Tapered Nobel biocare™ with TiUnite surface of 4.3mm diameter. Only 2 implants were lost (1.44%) with a total success percentage of 98.56% on the rest of the implants Tables 3 & 4 check result which corresponds to the literature

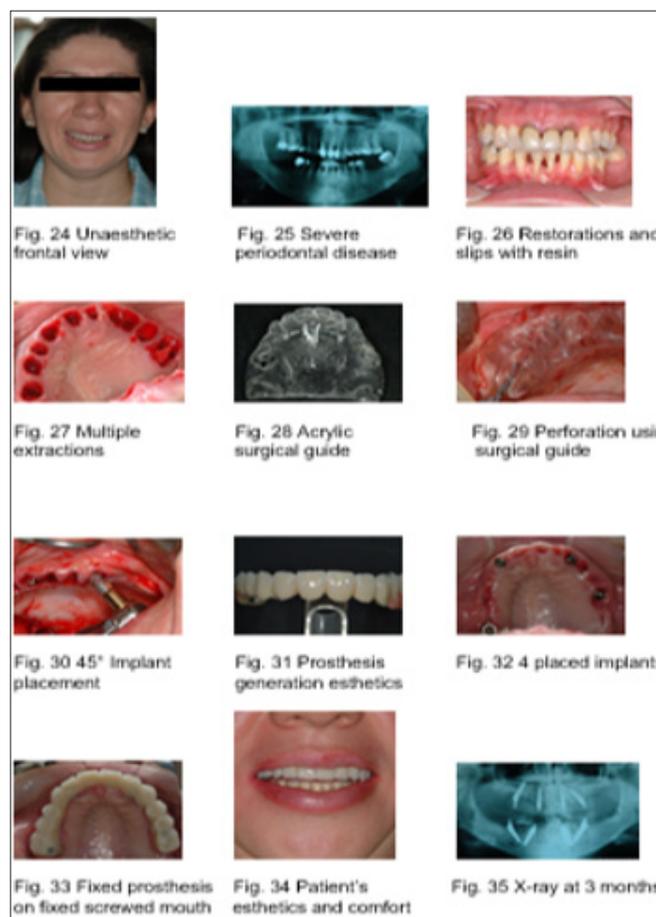
in relation to implant loss in the osseointegration phase [9]. The causes that could have favored this are that these were the first cases performed by us and we took this as part of the learning curve and experience that is acquired with practice; modifications further reduce work times at the office and provide comfort and satisfaction to treated patients (Case 3).

Table 3: Case success Mexico. (Implants lost were replaced immediately and were loaded in the same surgical act).

Maxilla	# of Implants	Implant Success	Prosthesis Success
Superior (14)	54	13mm (50)-10mm (2) 96.3%	(14) 100%
Inferior (4)	16	13mm (16)-10mm (0) 100%	(4) 100%

Table 4: Case success Colombia. (Follow-up and table with statistical results. Type of analysis used).

Maxilla	# of Implants	Implant Success	Prosthesis Success
Superior (2)	8	13mm (6) - 16(2) 100%	(2) 100%
Inferior (10)	40	13mm (28) - 10mm (12) 100%	(10) 100%



Case 3: Mexico.

Discussion

Tilted implants offer another alternative under our umbrella of treatments in patients without the economic possibility of investing in a conventional ideal treatment with a minimum of 6 or 8 implants [10] in a fixed total prosthesis, or in cases where complementary treatments are required such as bone grafts, sinus

membrane elevation, lateralization of the lower dental nerve and repositioning of the mental nerve, or simply because of the fear stated by the patient of undergoing another surgical intervention. One of the reasons why implants are currently successful is due to the osseointegration process with decreased time of 10-15 weeks (reinforce this evidence) breaking initial osseointegration dogmas add bibliography established by Dr. Per I Brånemark stating that

implants should be left unloaded for a minimum of 6-8 months, even up to 12 months.

World-wide research on TiUnite™ surface has demonstrated the intimate relationship held between the implant surface and tissue and surrounding live cells, increasing osseointegration and providing firmer anchoring, increasing treatment predictability especially in clinical demand situations [11]. This surface is titanium oxide enriched with crystals and phosphates with a micro structured topography characterized by the presence of 1-10µm open pores distributed within a low micrometer range (Case 3).

Histological studies demonstrate the presence of bone in the treated surface of implants after 7 and 28 days of healing indicating that TiUnite™ is an osteo conductor; additionally, the presence of Pseudopodia that joins preosteoblasts with pores on the TiUnite™ surface and then form osteoblasts that will create the collagen bone matrix and lastly mineralization [12,13].

Our implant survival results were comparable to those obtained by Malo and collaborators for the superior maxilla [7], where the survival rate was of 97.6 % while it achieved 98.56% in our case. Implant survival results for the inferior maxilla were of 100%; quite comparable to those obtained by Malo and collaborators of 98.2%. From the prosthetic point of view, survival was of 100% for both maxillae; results similar to those obtained by Malo [7-9].

More frequent technique complications from the prosthetic point of view were changes in implant angle which generated certain difficulty to position temporary titanium cylinders inside the prosthesis in some cases which increases difficulty and extends clinical time to create complete acrylic prosthesis. Another inconvenience that should be taken into account is generating a metallic reinforcement in the extension zone at free end from the prosthesis (cantilever) to prevent fracturing it, since one of the highest incidence factors described in the literature by Goodacre and collaborators is acrylic fracture [14].

Replace Select® Tapered Nobel biocare™ implants with TiUnite™ surface offer considerable advantages such as: immediate load and placement of fixed teeth in totally edentulous arches in a single day [15], implants can be placed in sockets immediately after extraction [16], their use has been reported in endodontic and periodontal injuries [17], it maintains a marginal bone crest and thereby stabilizes the suprayacent gum; in addition to integrating to soft tissue by the formation of an epithelium union similar to that of natural teeth acting as a barrier against present sulcular bacteria [18-20].

Conclusion

Placement of 4 implants for a total fixed prosthesis either in maxilla or jaw is one more option under our treatment umbrella due to anatomical limitations on one hand and economical limitations on the other, in addition to being an innovative technique that saves time, incorporates functionally and esthetics at more than 90% of patients and allows a better quality of life regarding mastication, phonation, and esthetics. The results obtained in this retrospective

study demonstrate that the four implant techniques either for the upper or lower maxilla, edentulous, with immediate load, using an implant supported screwed prosthesis is a reliable and predictable technique with a survival rate approaching 100%.

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