NeoArch®
MANUAL

GRAND MORSE™

NEODENT®
A Straumann Group Brand

A SMILE FOR EVERYONE.

NEODENT® NEOARCH® IMMEDIATE FIXED FULL-ARCH SOLUTION.

CONTENTS

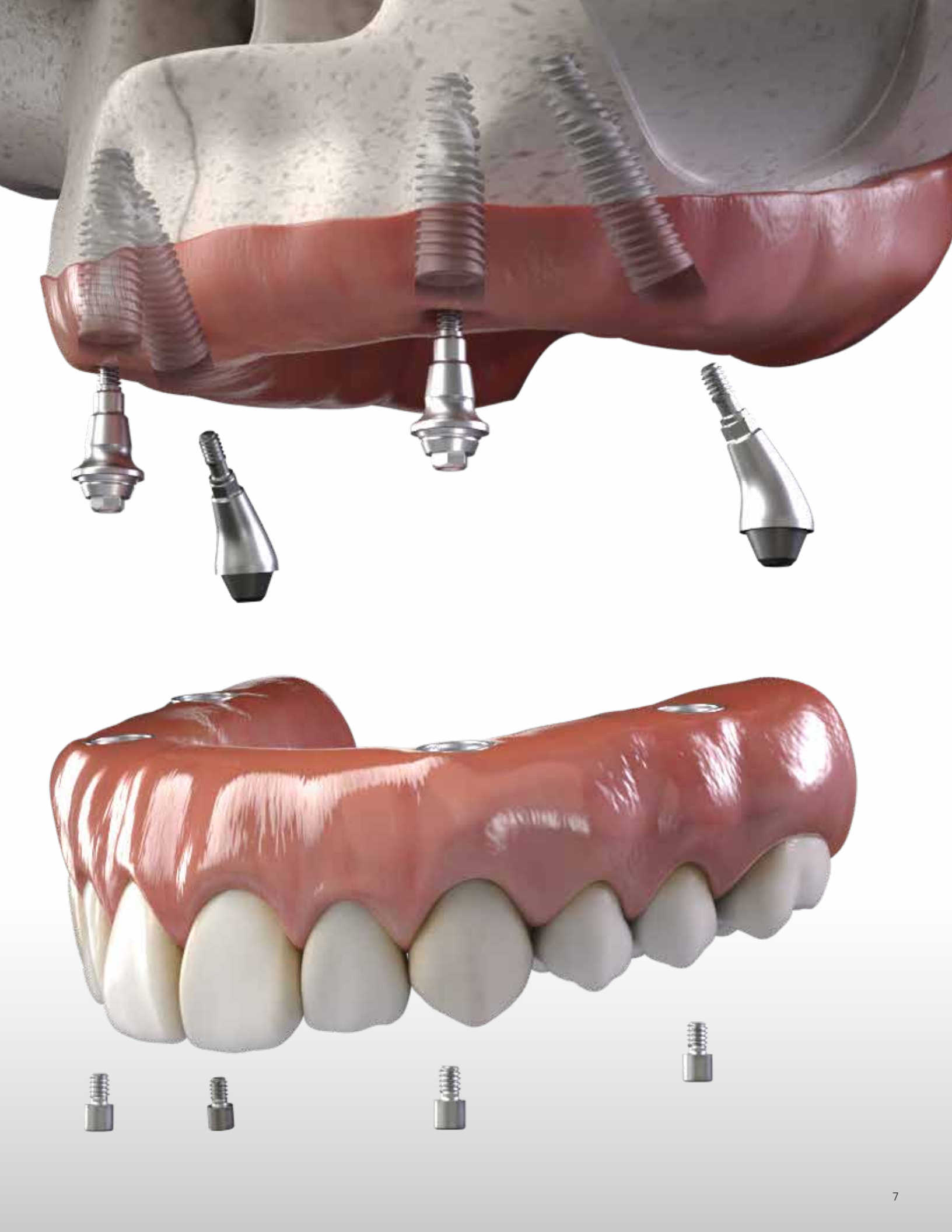
INTRODUCTION:

Treatment for Atrophic Edentulous Patients

The complete loss of natural teeth affects the elderly in particular and is a global issue. Globally, about 30% of people aged 65–74 have none of their natural teeth.[1]

In order to address the requirements and expectations of patients seeking fast, convenient, and reliable solutions for a full dental replacement, Neodent® NeoArch® is a full-arch prosthetic and surgical solution designed to use four implants supporting a fixed prosthesis in an atrophic alveolar residual ridge.

In general, a full arch supported by four implants provides proper stress distribution between rehabilitation components, and is considered a cost-effective approach indicated for extreme bone atrophy in both arches.[2,4] This manual outlines it's rehabilitation approach, that has been developed to support clinicians in the appropriate treatment plans for their patients, based on individual clinical parameters and needs.



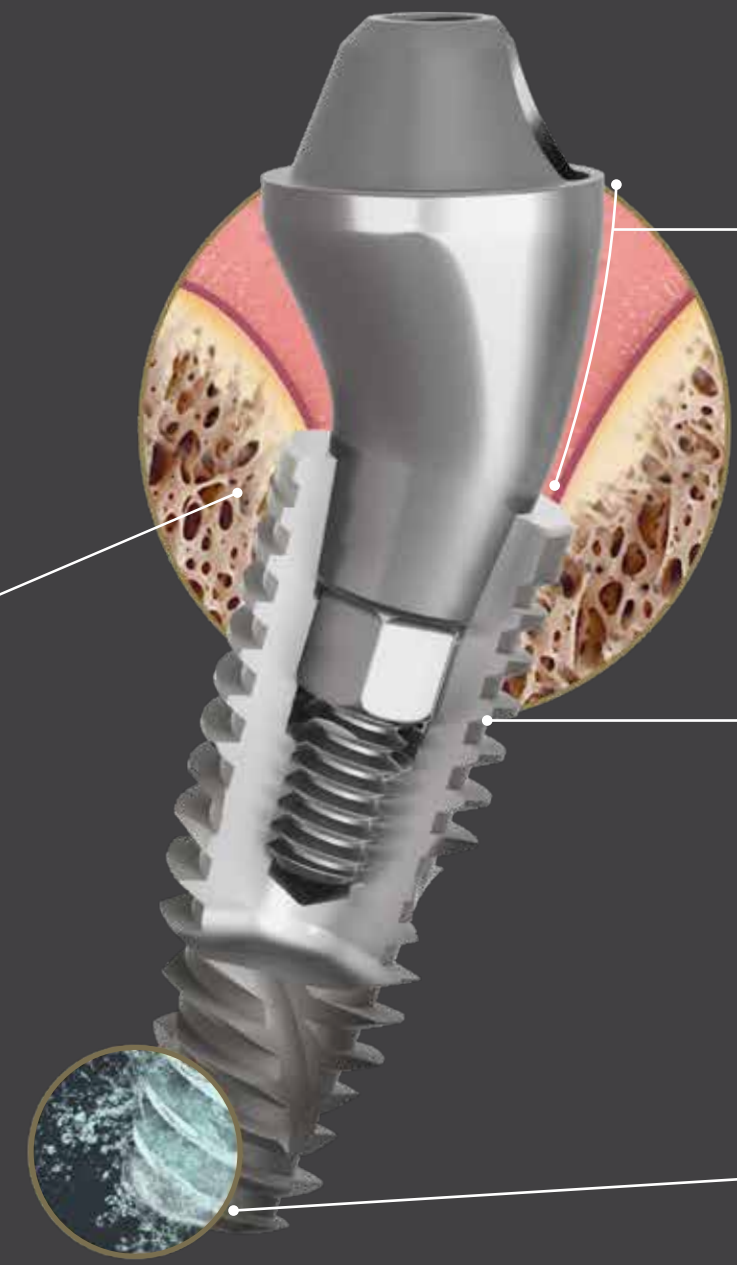
NEOARCH® DESCRIPTION

THE NEXT LEVEL OF IMMEDIATE FIXED FULL-ARCH

The NeoArch® Grand Morse® combines Neodent's® technologies designed to enhance immediate full-arch rehabilitation. The Grand Morse® stability, the Helix® versatility, the Acqua surface predictability, and optimized Mini Conical abutment shape all combined, maximize NeoArch® efficiency: one implant, one connection, one abutment.

Grand Morse® connection:
a stable and strong foundation designed for long term success.

- One prosthetic connection for all Grand Morse® Implants: ease of use.
- 16º Morse Taper connection: designed to ensure a tight fit for an optimal connection seal.
- Platform switching morse taper connection: fulfils the platform switching concept
- Deep Morse taper connection: designed for optimal load distribution.
- Internal Indexation: precise abutment positioning, protection against rotation and easy handling.



Mini Conical Abutment: immediate natural-looking esthetics.

- Optimized emergence profile: reducing the need of bone profiling.
- Several gingival height options: adapting to tissue availability.
- Optimal angulation of 17º and 30º: fitting to patient anatomy.
- Short core, wide angle: maximizing passive fit and angulation compensation.

Helix® Grand Morse®: unbeatable versatility.

- Fully tapered body design: allows for under prepping of the osteotomy.
- Hybrid contour: enabling stability with vertical placement flexibility.
- Dynamic progressive thread design: designed to achieve high primary stability in all bone types.
- Active apex: self-tapping.

Acqua surface: high treatment predictability.

- Sand-blasted Large grit and Acid etched surface: NeoPoros highly successful surface.
- Hydrophilic surface: immediate greater surface accessibility.[5]

NeoArch®:
Clinical Approach

The NeoArch® fixed full-arch solution brings from planning phase through final restoration a clear workflow to aid the clinician.

1 PREOPERATIVE PLANNING

- *Anatomical considerations*
- *Digital 3D planning*
- *Implant distribution and prosthetic definition*

2 SURGICAL PROCEDURES

- *Immediacy: implant designed to achieve primary stability*
- *Surgical site preparation and implant placement*
- *Bone profile use*

3 PROSTHETIC WORKFLOW

- *Abutment selection*
- *Impression taking on abutment level*
- *Immediate temporization*
- *Final fixed restoration – conventional*
- *Final fixed restoration – digital*
- *Comprehensive restorative solutions*

4 FOLLOW-UP

- *Cleaning and care*

1 PREOPERATIVE PLANNING

1.1 Anatomical Considerations

High success rates have, in recent years, been reported with the use of four implants in the rehabilitation of edentulous patients.[3,6] However, certain technical aspects have to be considered before surgery in order to help ensure treatment success.[7,8] All full-arch reconstruction starts with a clear and previously-defined prosthetic plan, developed according to the patient's remaining structures, including residual alveolar bone and smile line.

Residual Alveolar Bone

The residual alveolar ridge undergoes physiological resorption after complete tooth loss (Fig 1). This resorption can be located in different zones in the arch. Patients presenting atrophic conditions with minimum residual bone are indicated to receive 4 implant-retained rehabilitations.

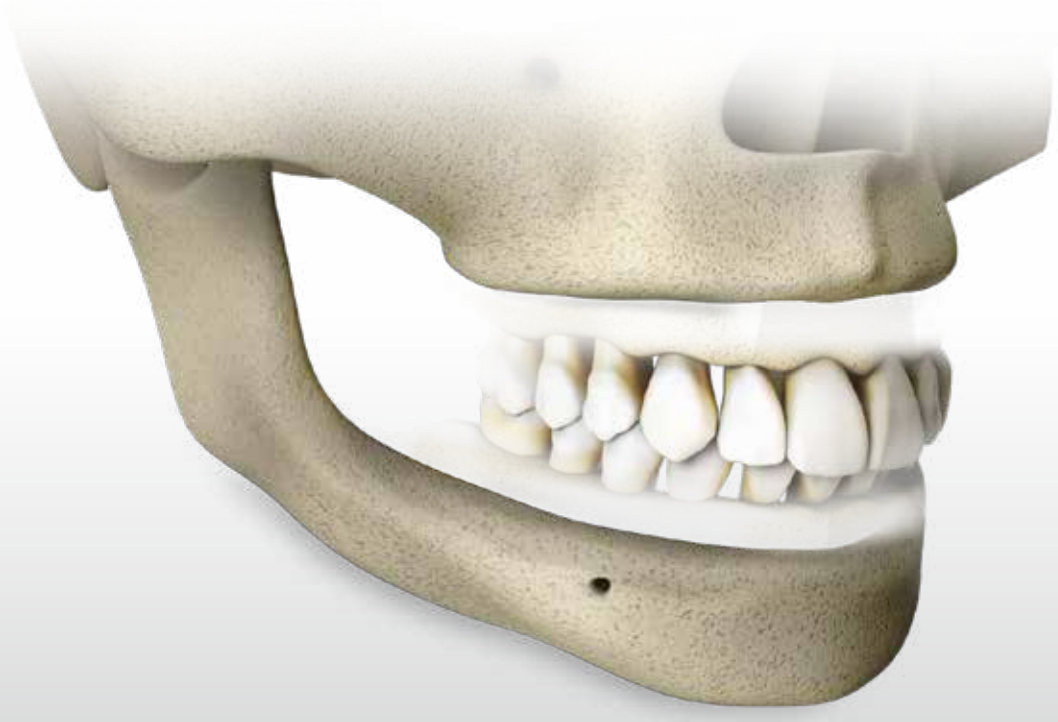


Fig 1. Mandible and maxilla bone resorption after complete tooth loss.

The maxilla has a lower bone density than the mandible, especially when compared at the anterior mandible region between the mental foramen region. Therefore, bicorticalization is a good method for achieve high primary stability of implants in maxilla. In addition, tilted distal implants are an effective strategy to enhance contact area with remaining bone avoiding challenging anatomical structures and allowing bicorticalization with longer implants than if they were placed straight (Fig 2). At the same time, anterior implants are limited by the nasal cavity and sometimes can be placed in a tilted fashion, also with the apex distally angled, which results in the same benefits, and is known as the M-4 treatment.[9]

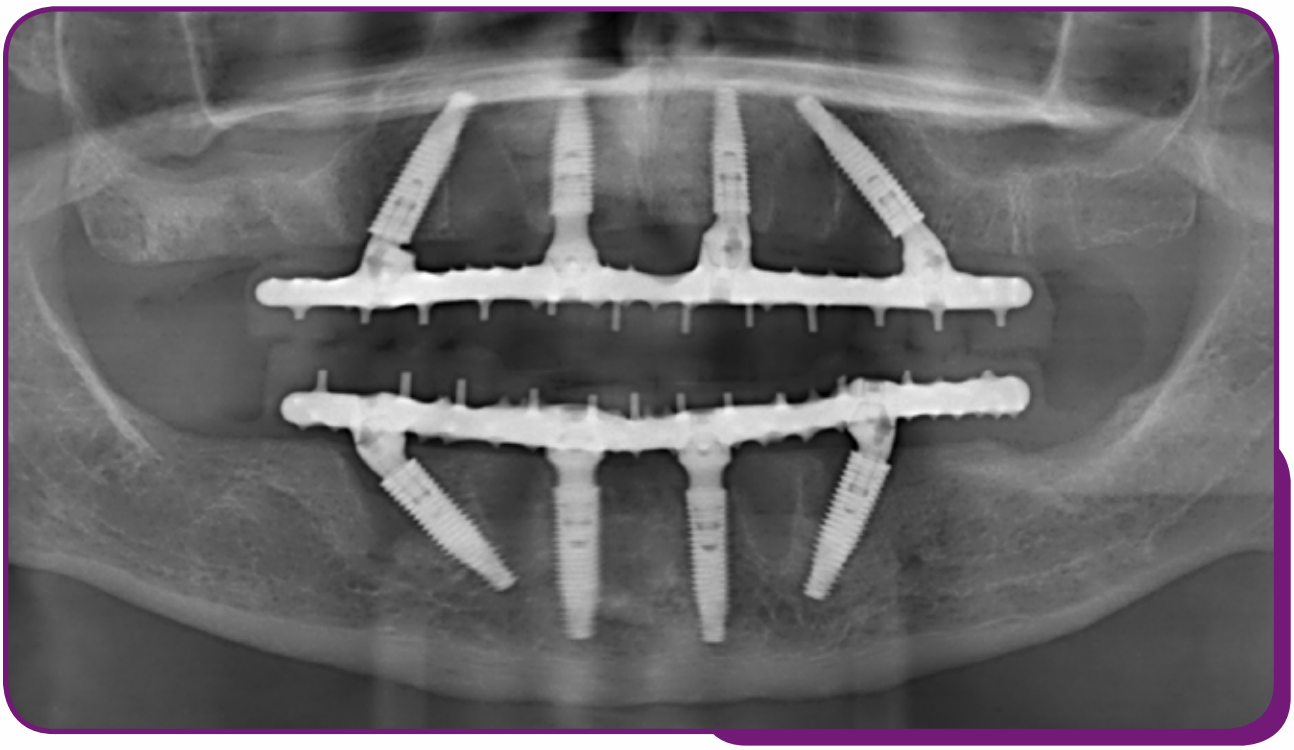


Fig 2. Higher bone density for positioning implants on sinus and nasal cavity walls.
*Patient treatment data authorized for publication.

Smile Line

The patient's smile line determines the esthetic challenges that will drive important surgical and prosthetic procedures when the aim is a natural looking solution. Both characteristics, the smile line combined with the residual alveolar ridge height, (Fig 3) dictate bone horizontal osteotomy, implant positioning and prosthetic extension (with or without "pink esthetic") based on esthetics space for the restoration, and hygiene of the final prosthesis.

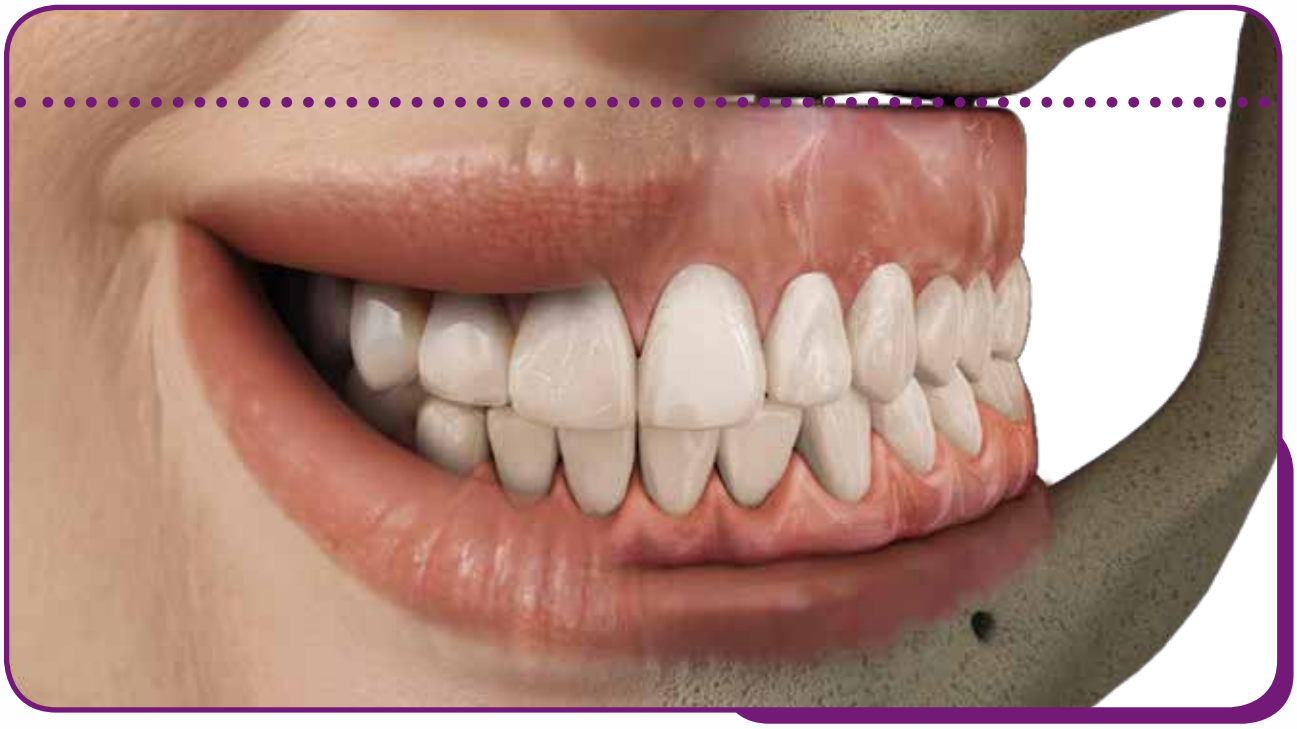


Fig 3. Rehabilitation extension according to patient's structures.

The upper lip defines the patient's smile line. The contact between the bridge and the remaining mucosa should never be exposed. Although, there may be esthetic problems in the final restoration. The upper lip must cover the transition line between bridge and remaining mucosa.

DURING THE PLANNING STAGE, IT IS IMPORTANT TO EVALUATE THE VOLUME OF PATIENT'S RESIDUAL ALVEOLAR BONE.

VOLUME OF RESIDUAL ALVEOLAR BONE

	SMALL	***MID***	***HIGH***
BEFORE			
Indication for horizontal osteotomy	Not indicated if the bone is in harmony with the upper lip and even.	Indicated to flatten the bone to avoid esthetic and functional problems.	Not indicated if the bone is in harmony with the upper lip and there is prosthetic space for the restoration (see also smile line).
Smile Line High	No osteotomy if the remaining bone is parallel to the upper lip, even and covered by the upper lip.	No osteotomy if the remaining bone is parallel to the upper lip, even and covered by the upper lip.	No osteotomy if the remaining bone is parallel to the upper lip and even. Osteotomy is only indicated if the remaining bone isn't in harmony with the upper lip.
Smile Line Low	No osteotomy if the remaining bone is even.	No osteotomy if the remaining bone is even.	No osteotomy if the remaining bone is covered under the upper lip, even and there is space for the prosthesis.
AFTER			
Type of restoration	Large amount of pink esthetic in the restoration.	Small amount of pink esthetic in the restoration.	No pink esthetic.

Table 1. Previously uneven smile line between crowns and mucosa due to bone block extrusion and smile line after osteotomy for fixed full-arch rehabilitation.

1.2 Digital 3D Planning

For a successful full-arch rehabilitation, the initial prosthetic planning constructed with the aid of a tomography guide according to proper occlusion using Cone Beam Computed Tomography (CBCT) images will define the proper position of implants, and takes into consideration anatomical structures, especially for tilted posterior implants (Fig 4). If the patient presents a well-established conventional complete denture, it also can be used as a guide and as an immediate provisional implant-supported prosthesis. In addition, specific planning software can be used to determine implant positions and angulations.

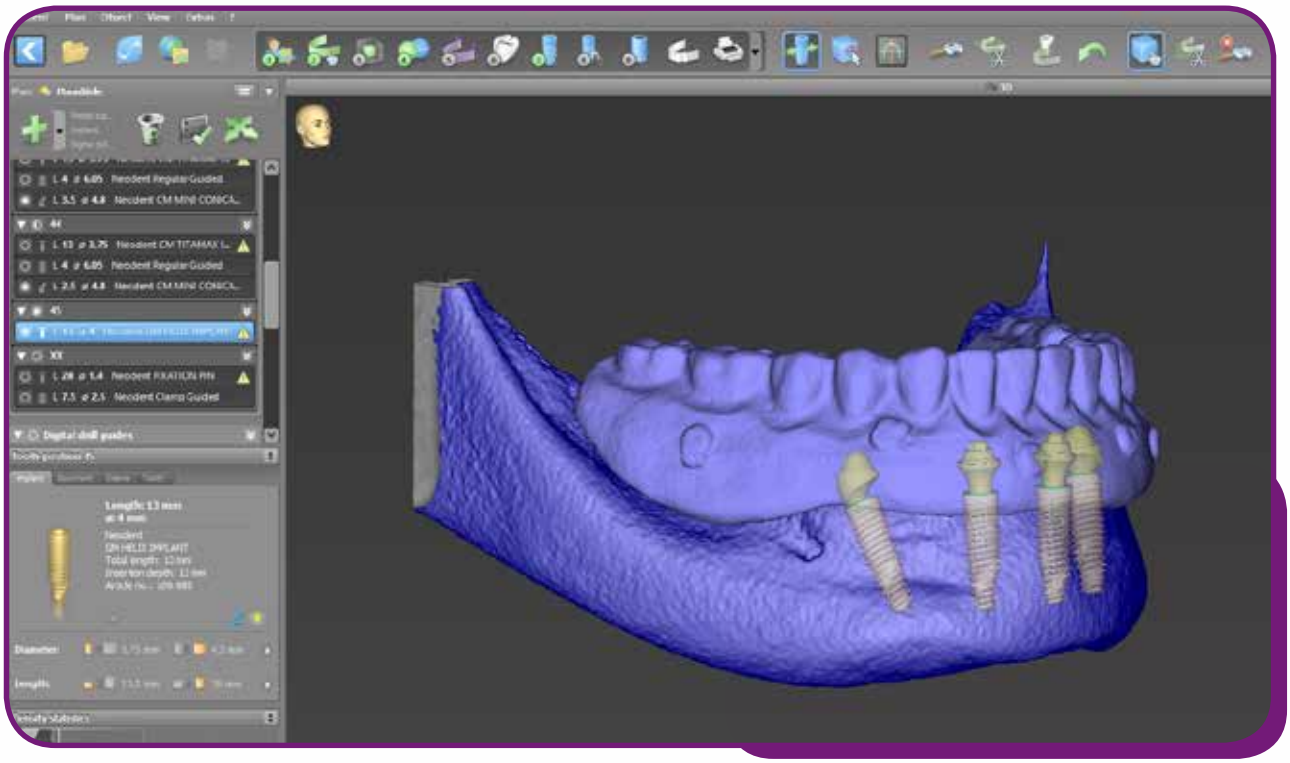


Fig 4. Implant distribution according to bone availability and prosthetic planning.
*Data extracted from coDiagnostiXTM software.
*Patient treatment data authorized for publish.

1.3 Implant Distribution and Prosthesis Definition

Implant distribution is an important factor to be considered in full-arch bridges as it determines mechanical result on the system. Anteroposterior implant placement and occlusion should be balanced to avoid stress concentrations.[9,10] It has already been proven that high success rates can be achieved with a smaller number of implants (four).[3,6] The use of only four implants also allows more options for the final position and anteroposterior distribution when planning the rehabilitation.[9,10]

Clinicians can define implant distribution based on the size of the cantilever where distal implants are initially determined. The medial implants can then be placed as far anterior as possible to spread the implants along the arch and distribute forces equally across the entire arch and implants (Fig 5).

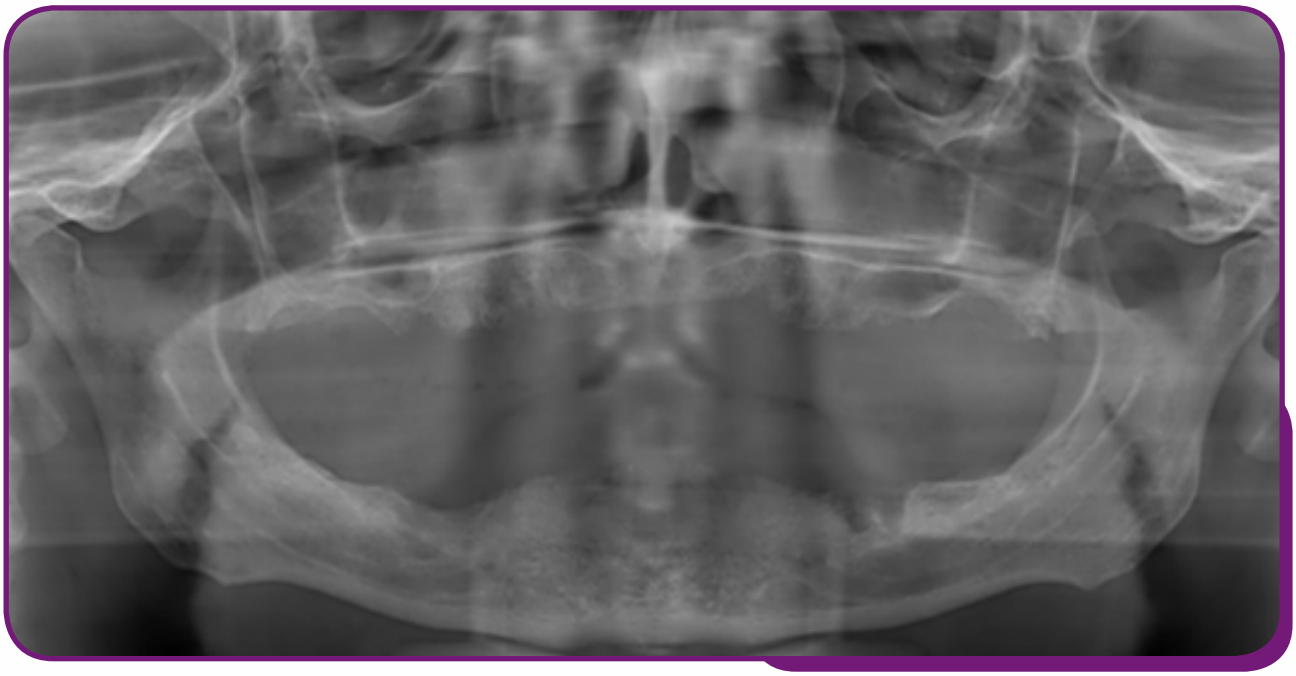


Fig 5. Panoramic radiography of an edentulous patient
*Patient treatment data authorized for publication.

Note: Anterior/posterior implant distribution on the arch should be carefully evaluated because this determines stress distribution of the system (Fig 5).

Distal implants should be placed before anterior implants as they determine the posterior limits of implant distribution and are closer to key anatomical structures that must be avoided, such as the mental foramen in the mandible and anterior portion of the sinus floor for the maxilla. Because the posterior tilted implants installation occurs around the 1st and 2nd pre-molar region, a short cantilever is indicated to extend until the 1st molar, which decreases stress on the peri-implant cortical bone and increases the rehabilitation's longevity. Therefore, the prosthesis should extend to a maximum of 12 teeth.

For mandible rehabilitations, cantilever size is indicated up to 2 teeth (2nd pre molar and 1st molar) and anterior implants are ideally placed in the lateral incisor region (Fig 6).[9,10]

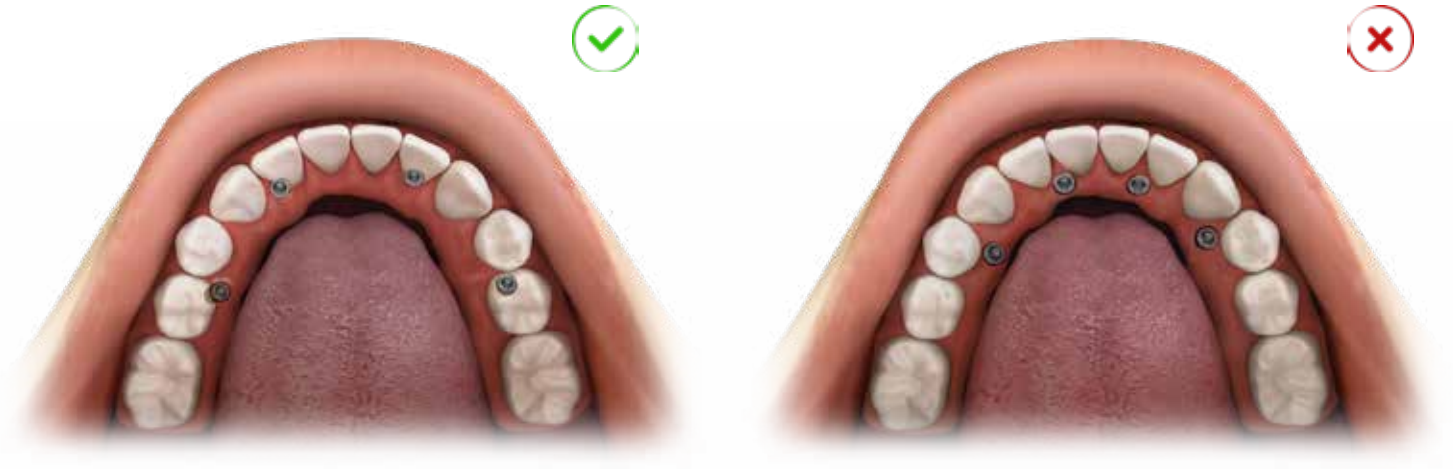


Fig 6. Force distribution and resistance proportions on full-arch rehabilitations with four implants.

In maxilla planning, the cantilever should extend only for the 1st molar. Anterior implants can be located at the lateral incisor or canine region [9,10] (Fig 7).

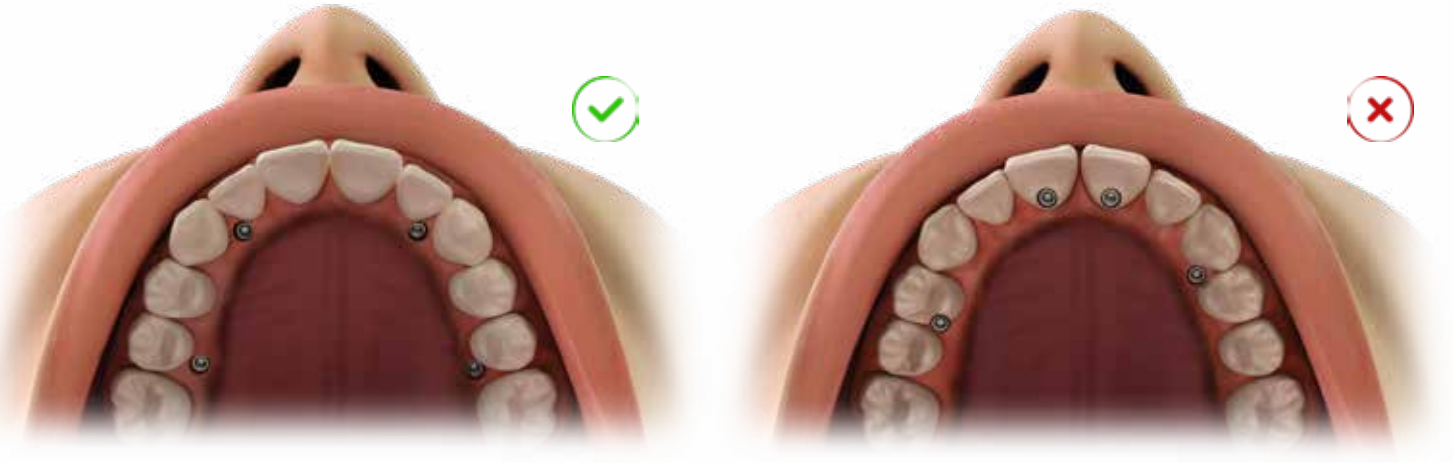


Fig 7. Proportion and relation of implants positioning and size of cantilever.

For a better stress distribution, the outlined shape between the implants should be the largest square format as possible.

2 SURGICAL

2.1 Immediacy: Implant designed to achieve primary stability

Ideally, a full arch procedure should optimize an immediate loading with a minimum torque implant placement,[12-16] and a final prosthesis with proper occlusion. Grand Morse™ Helix implants have a dual tapered outer shape with compressive threads in the coronal area and cutting threads at the apex designed to achieve high stability even in areas of poor bone density. Additionally, implant selection based on the principle of bicorticalization can achieve a higher torque,[17,18] and therefore, more options of lengths and diameters are available for surgeons using this technique.

Height Options

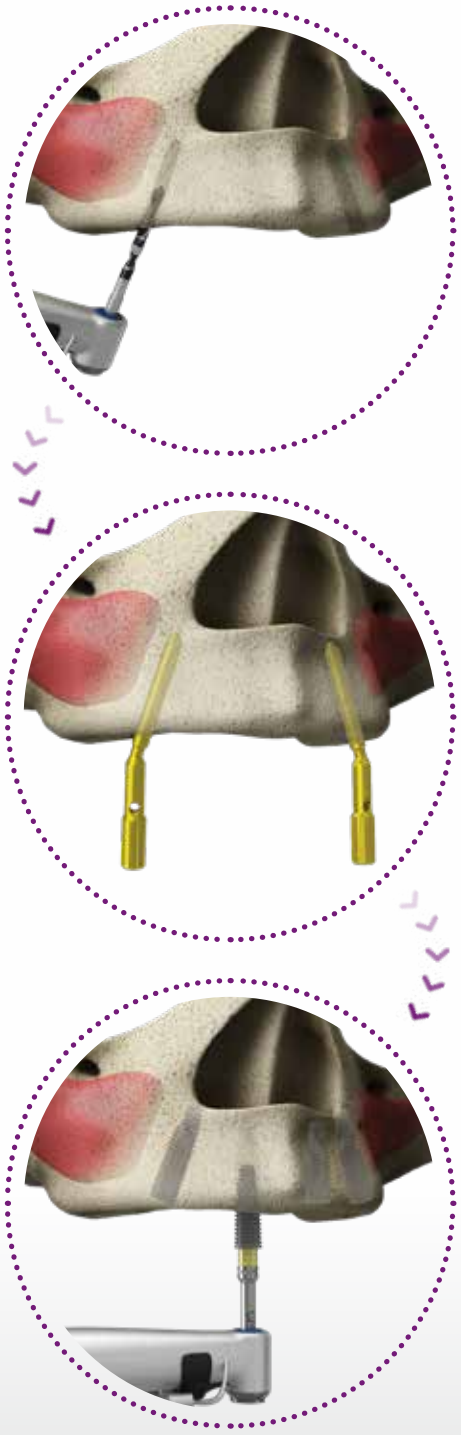
Angle Measurers

Diameters Options

Table 2. Lenghts, diameters of Helix implants, and angle measures to support implant direction and align with abutment position.

2.2 Surgical site preparation and implant placement

Once the prosthetic and surgical planning are both completed, a flap technique can be used after osteotomy, if necessary for implant placement. The following steps are indicated:



MAXILLA INSTRUMENTATION:

1. Locate important anatomical structures such as maxillary sinus and nasal cavity to place properly tilted implants. Distal implants are placed in the 2nd premolar or 1st molar region and anterior implants in the lateral incisors region. The implant site is prepared by drilling to the appropriate depth and diameter according to previous planning and the instructions for use *ifu.neodent.com.br/en*.

2. After 2.0 drilling, position the GM Angle Measurer for Drill 17º or 30º to analyze if tilted preparation is in accordance with the patient residual ridge arch line and the future prosthetic alignment (Fig 9).

3. Place distal tilted implants first, and then the straight anterior implants in the prepared bone site beginning with handpiece at a rotational speed of 30 rpm and a torque of 32 Ncm (Fig 10). The handpiece driver has metal tweezers in the active apex to keep the implant stable during transport. Finalize implant placement with the torque wrench connection by positioning the implant with the Exact dimple facing to the mesial site and acccording to the patient residual ridge arch line for tilted implants, and buccal site for straight anterior implants placement, providing prosthetic orientation.

Note: the line markings on torque wrench connections are designed to set the bone level implant positioning. To install anterior implants, prepare anterior sites as far apart from each other as possible and with a safe distance from tilted posterior implants.

Fig. 11

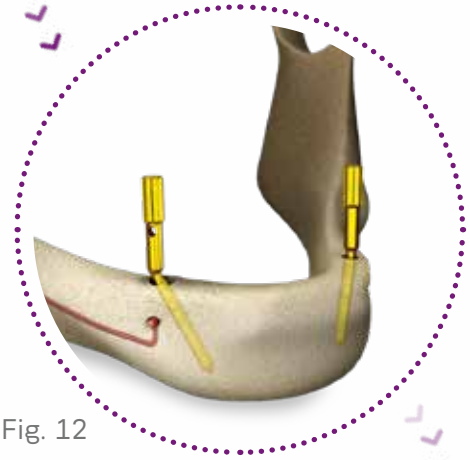


Fig. 12

Fig. 13

MANDIBLE INSTRUMENTATION:

1. Locate important anatomical structures such as the inferior alveolar nerve and place tilted implant avoiding such structures (Fig 11). Distal implants should be positioned in the 1st premolar region and anterior implants in the lateral incisors region.

2. The implant site is prepared by drilling to the appropriate depth and diameter according to previous planning and the instructions for use (ifu.neodent.com.br/en). After 2.0 drilling, position the GM Angle Measurer for Drill 17º or 30º to analyze if tilted preparation is in accordance to the patient residual ridge arch line and the future prosthetic alignment. Continue the drilling sequence until reach the proper alveolar site diameter.

3. Place distal tilted implants first, and then the straight anterior implants in the prepared bone site beginning with handpiece speed of 30 rpm and a torque of 32 Ncm (Fig 13). The handpiece driver has metal tweezers in the active apex to keep the implant stable during transport. Finalize installation with the torque wrench connection by positioning the implant with the Exact dimple facing to the mesial site and acccording to the patient residual ridge arch line for tilted implants, and buccal site for straight anterior implants placement, to provide prosthetic orientation.

Note: the line markings on torque wrench connections are designed to set the bone level implant positioning. To place anterior implants, prepare anterior sites as far apart from each other as possible and with a safety distance from tilted posterior implants.

Fig 14. After implant placement make sure that the angle measurer is aligned with the patient residual ridge arch line.

2.3 Bone Profile Use

Bone Profile Drill is used to remove bone, if necessary, around the implant platform in the following situations:

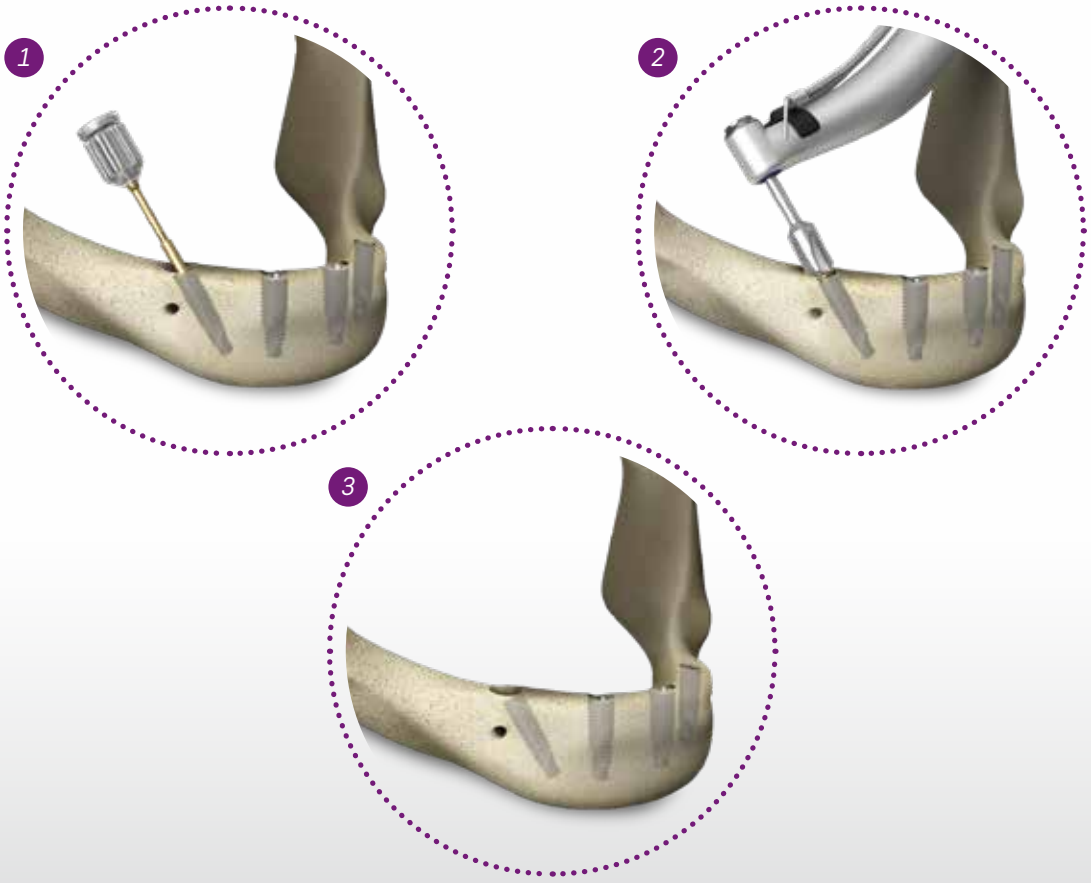
- Tilted implants for abutment emergence profile;
- Subcrestal implants positioning;
- Uneven residual alveolar ridge.

The following sequence is indicated:

1. Install the Bone Profile Drill Guide into the implant with the Manual Neo Screwdriver (Fig 15).

2. Fit the Bone Profile Drill into the handpiece and place it over the Guide (Fig 16).

3. Drill into the coronal bone around the implant in cases where the bone interferes with the abutment's emergence profile (Fig. 17). Use an intermittent drilling technique with abundant irrigation.

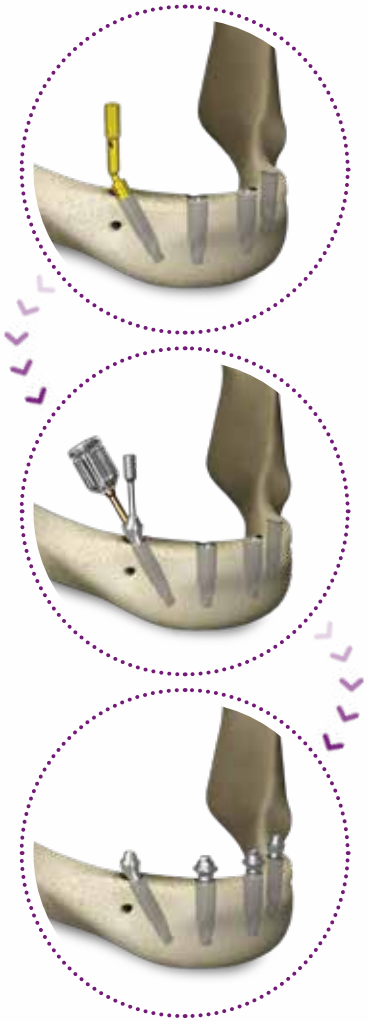


Note: When drilling, keep the bone profile and the guide aligned. Do not apply bending forces and be aware that abundant irrigation is necessary.

3 PROSTHETIC
(Clinical & Laboratory)

3.1 Abutment Selection

After the implants placement, the following steps for abutment installation are indicated:



1. For tilted posterior implants, the use of angled abutments is recommended. For abutment selection use the GM Angle Measurer intraorally to determine the final angulation and positioning of Abutment and gingiva height (Fig 18). If the angle measurer is not pointing to the patient residual ridge arch line, the implant still can be rotated for a proper prosthetic future alignment (Fig 14).

2. Install the angled GM Exact Mini Conical Abutment 17°/30° with Neo Screwdriver at a torque of 20 N.cm (Fig 19).

3. There are two options for anterior straight abutments: Micro or Mini Conical Abutment. The difference is that the Micro Conical abutment is recommended for patients that present reduced interocclusal space, providing wider space for a bar construction and/or prosthetic material. For both abutments, use the hexagonal driver with a torque of 32 Ncm. Install the final abutments (Fig 20).

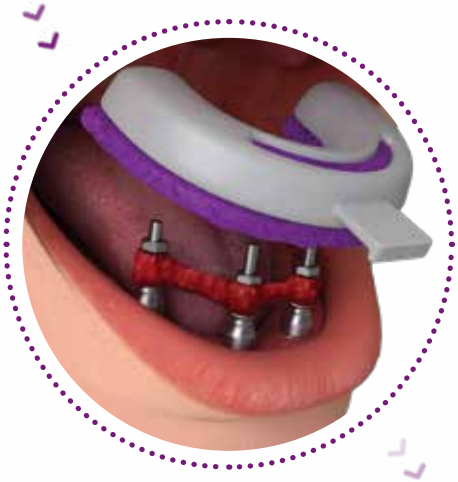
Note: Angled abutments are delivered pre-assembled, which simplifies abutment placement in the posterior region (Fig 19). Furthermore, the pre-assembled driver indicates the orientation of the occlusal screw channel. Additionally, angled abutments are presented in 17° or 30° degrees and 1.5, 2.5, or 3.5 mm gingiva height.

Figure 21 shows the optimized emergence profile that the new GM Mini Conical Abutment can produce, since is anatomically curved shape. This feature is also designed to facilitate patient daily cleaning procedures.

3.2 Impression taking on abutment level

Once the surgical procedures and abutment placement are completed, an impression is taken to cast the final abutment positions in the plaster model. The following steps for an OPEN TRAY IMPRESSION are indicated:

1. Place the Slim Mini Conical Abutment Open Tray Impression Coping accurately into the abutment and only rotate the screw, manually or with the aid of Neo torque Connection (Fig 22). Make perforations in the custom-made impression tray (light-cured resin) according to the individual situation and check if the Screw of Impression Coping protrudes visibly.



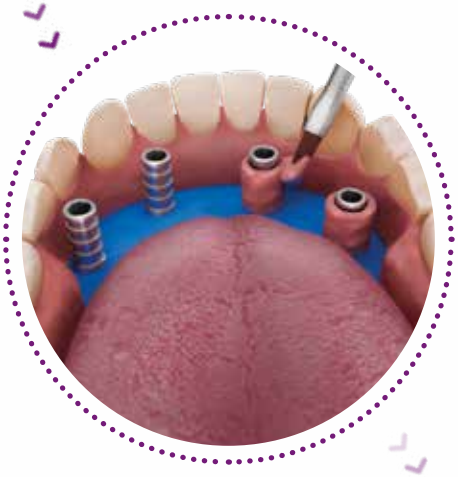
2. Splint the Impression Copings using a low shrinkage polymerization acrylic resin according to manufacturer recommendation. It is recommended to take the impression using a standard elastomeric impression material (e.g. polyvinyl siloxane). Uncover the screws before the material is set. Once the material is set, loosen the Copings Screws with the Neo Torque Connection and remove the tray. For easy abutment identification, include the analogs when you send the dental impression to your dental lab partner (Fig 23).

3. Fabricate the master cast with stone type IV (Fig 24) or proceed with a digital scanning process creating a 3D printed model. For conventional workflow, a gingival mask should always be used to ensure that the emergence profile is optimally contoured. This final plaster model will be used in the next steps of restoration process.

3.3 Immediate temporization

In the 48 hours after the surgical procedure, clinicians can provisionally restore the patient's oral function and aesthetics. The restorative portfolio contains the Neo Distal Bar to strengthen the provisional transition from complete denture to fixed full-arch. The following steps for an IMMEDIATE TEMPORIZATION are indicated:

1. Promote lingual wear on the conventional complete denture preserving the buccal and posterior region integrity (Fig 25).

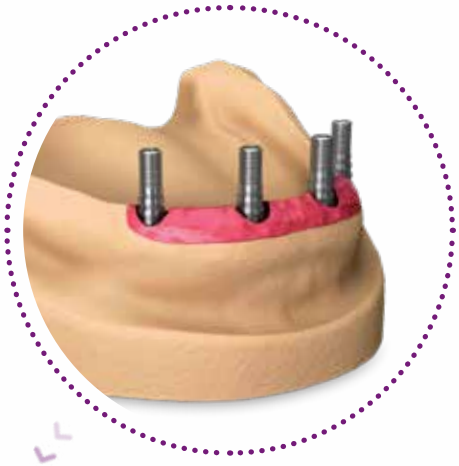


2. Place non-engaging Titanium Copings on the anterior and posterior abutments. Proof the alignment and relation between implant components and prosthesis. Once the position is ensured, make sure the occlusal set up fits with the prepared prosthesis and place a rubber sheet over the copings to protect and avoid acrylic resin contact with soft tissue (Fig 26). Apply pink acrylic resin around the copings. Patient should be in occlusion to establish a proper central relation between arches until resin polymer.

3. Finalize and polish the temporary restoration. Place the temporary restoration in the patient's mouth and tighten the occlusal screws to 10 Ncm using the Neo Screwdriver (Fig 27).

3.4 Final Restoration – Conventional

After the final plaster model is produced, the bar can be made at the laboratory center by conventional cast.



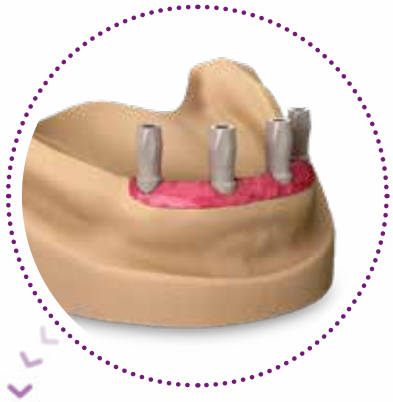
1. Place the castable copings (One step hybrid set or conventional copings) on the top of the analogs with a 10 Ncm torque (Fig 28). Wax-up the bar-framework according to the availability of patient interocclusal space.

2. Cast the bar and check its alignment over the model (Fig 29). For conventional casting, a clinical section is required to ensure passive fit of the bar. If not, perform a cross-section on the bar and reconnect intraorally with low shrinkage polymerization acrylic resin, reestablishing the bar fit. For One step hybrid technique, cement the structure over titanium copings.

3. Produce the final restoration based on the custom-milled framework. Install final complete fixed restoration on the patient's mouth (Fig 30).

3.5 Final Restoration – Digital

If you decide to work with a custom-milled digital framework, please proceed as follows:



1. Fabricate a master cast based on a dental impression or proceed with digital scanning process to create a 3D printed model. Place the Mini Conical Abutment Scanbodies onto the analogs on the dental model using the 1.2 Manual Screwdriver (Fig 31).

2. Scan the plaster model set with the help of a scanner and design the framework in CAD software (Fig 32).

3. Produce the final restoration based on the custom-milled framework (Fig 33).

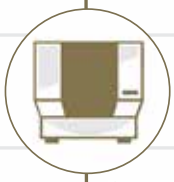
4. In the dental office, place the final restoration into the patient's mouth (Fig 34).

Visit http://en.neodent.com.br/libraries-cadcam to download the digital Neodent® files. Libraries are available for the following softwares: CARES Visual, Dental Wings and 3Shape.

3.6 Comprehensive restorative solutions: meet all patient expectations.

Meet patient stability and comfort expectations thanks to comprehensive custom made milled frameworks for provisional or final restoration at the abutment level using a broad range of materials and any workflow.

Provisional fixed prosthesis



Final fixed prosthesis

Straumann® CARES / Workflow
Milling center solution

Provisional fixed prosthesis

Final fixed prosthesis

Straumann® M series/Zirkonzahn M4
In-house milling solution

Provisional fixed prosthesis
Mini Conical temporary coping/
Mini Conical distal bar coping

Final fixed prosthesis
One Step Hybrid

Conventional manufacturing solution

4 FOLLOW-UP

4.1 Cleaning and Care

For long-term success and proper fit of the fixed bridge, comprehensive patient instruction and periodic check-ups (at least once a year) are recommended. During these visits, you should carefully examine the:

1. Condition of the peri-implant tissues with regard to oral diseases such as plaque and calculus, bleeding, recession, and bone loss, by taking regular periapical radiographs.

2. Superstructure and prostheses occlusion, proper fit of the fixed bridge, wear of occlusal surface, retention, screw loosening, and abutment status.

3. Function of the prostheses.

Provide professional cleaning with the aid of ultrasonic or periodontal curettes, removing the prosthesis if necessary, and use cleaner prostheses agents. If a proper maintenance of the fixed restoration is provided, it is not necessary to exchange the occlusal screws at each check-up visit.

A full-arch prosthesis requires spaces for the framework and the esthetical veneering (can be either ceramic or acrylic). Also, from a functional point of view, full-arch bridges should allow for the patient's future hygiene and should never cover the remaining tissue, which will facilitate the patient's cleaning of the bridge.

For proper care at home, instruct the patient to clean the space between gingiva and fixed bridges, especially around the implants on a regular basis. Dental floss or interdental brushes are recommended.

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Straumann North American Headquarters
Straumann USA, LLC
60 Minuteman Road
Andover, MA 01810
Phone 800/448 8168 (US) • 800/363 4024 (CA)
Fax 978/747 2490
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