Neodent®

Zygoma Implants
SURGICAL MANUAL

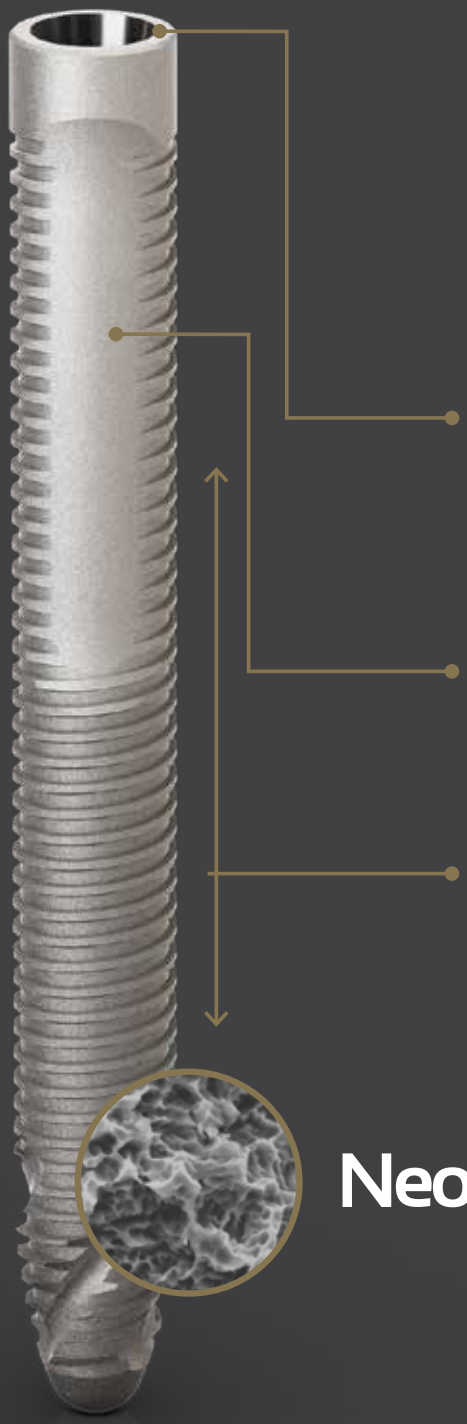
GRAND MORSE™

NEODENT®
A Straumann Group Brand

CONTENTS

NEOARCH® ZYGOMA GM™

Implant for zygomatic anchorage



1. GRAND MORSE™ CONNECTION

- All the benefits of the original 16° Morse taper GM connection designed for a tight fit for an optimal connection seal.
- Straight head designed to bring flexibility to the implant positioning.

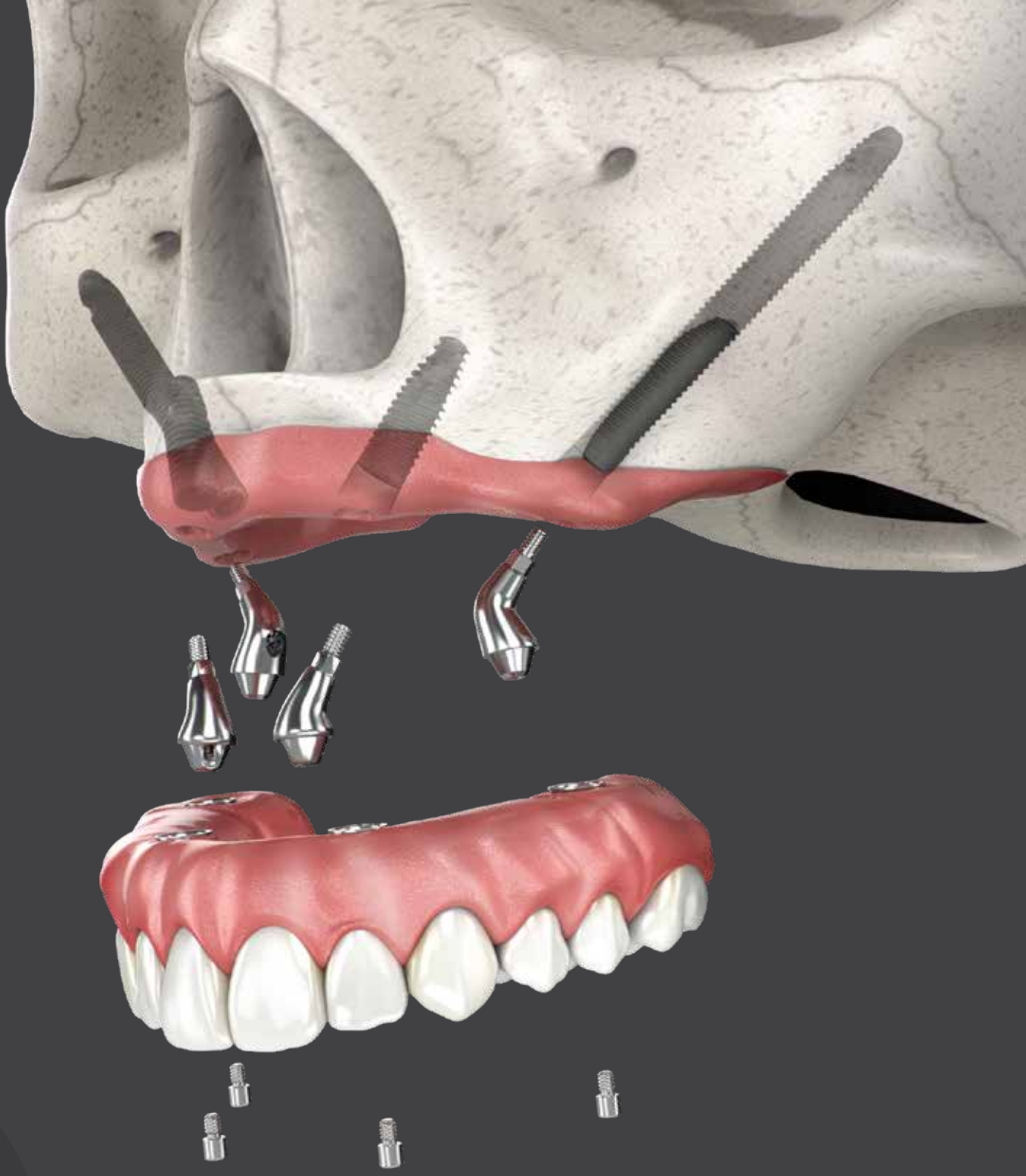
2. IMPLANT DESIGN

- Tissue protect portion without threads for a contact with the mucosa.
- Progressive increase of the thread depth at the apical area.

3. COMPREHENSIVE PORTFOLIO

- 4.0 mm of diameter.
- Ten different lengths: 30 / 35 / 37.5 / 40 / 42.5 / 45 / 47.5 / 50 / 52.5 / 55 mm.

NeoPoros



PRE-OPERATIVE PLANNING

1. Anatomical Considerations

Prosthetic rehabilitation starts with a clear and previously-defined prosthetic plan, developed according to the patient's remaining structures, including residual alveolar bone and smile line.

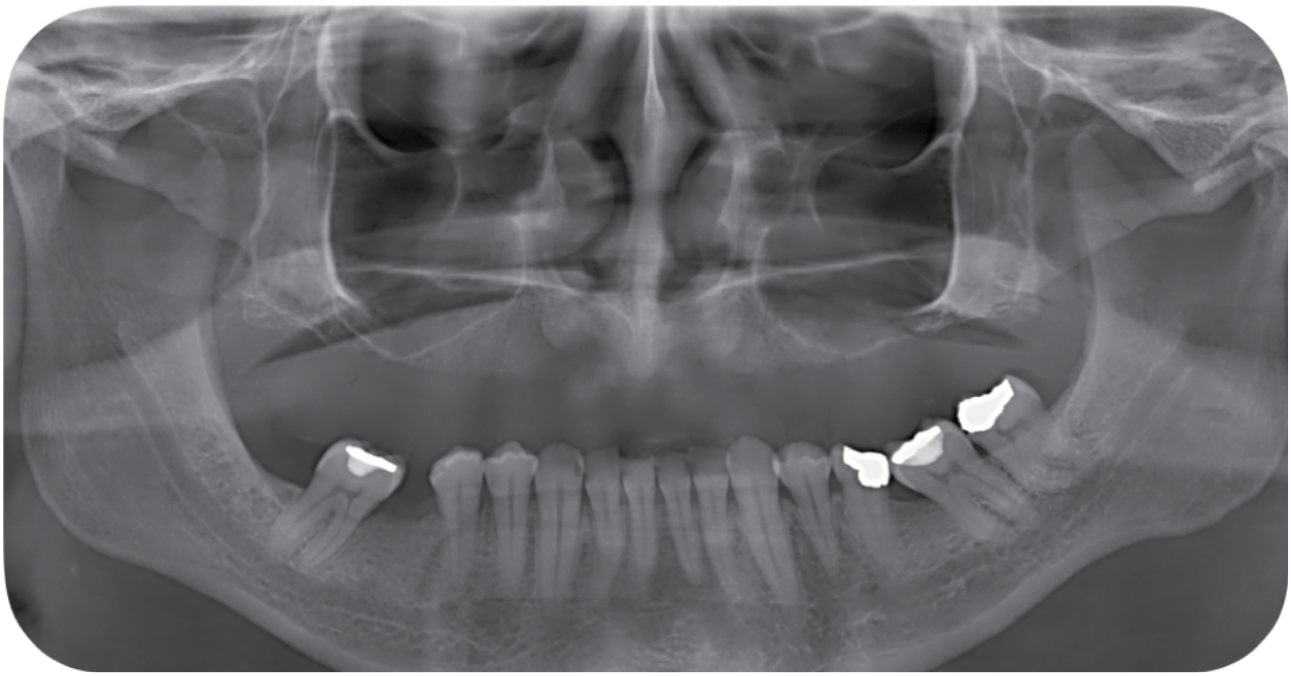
Note: Full-arch restoration is presented as an example throughout this manual--the zygoma implants are also indicated for partial-arch applications.

Residual Alveolar Bone

The residual alveolar ridge undergoes physiological resorption after tooth loss (Fig 1). This resorption can be located in different zones in the arch. Patients presenting atrophic conditions are indicated to receive fixed full-arch rehabilitations. The use of implants becomes important to retention and stability of the entire system.

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 to achieve high primary stability of implants in the maxilla. In addition, Zygoma implants can be an effective strategy to enhance contact area with remaining bone avoiding anatomical challenging structures and allowing bicorticalization (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[1].



* Patient treatment data authorized for publish.

Fig 2. Sinus and nasal cavity walls might present higher bone density for positioning the implants.

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.

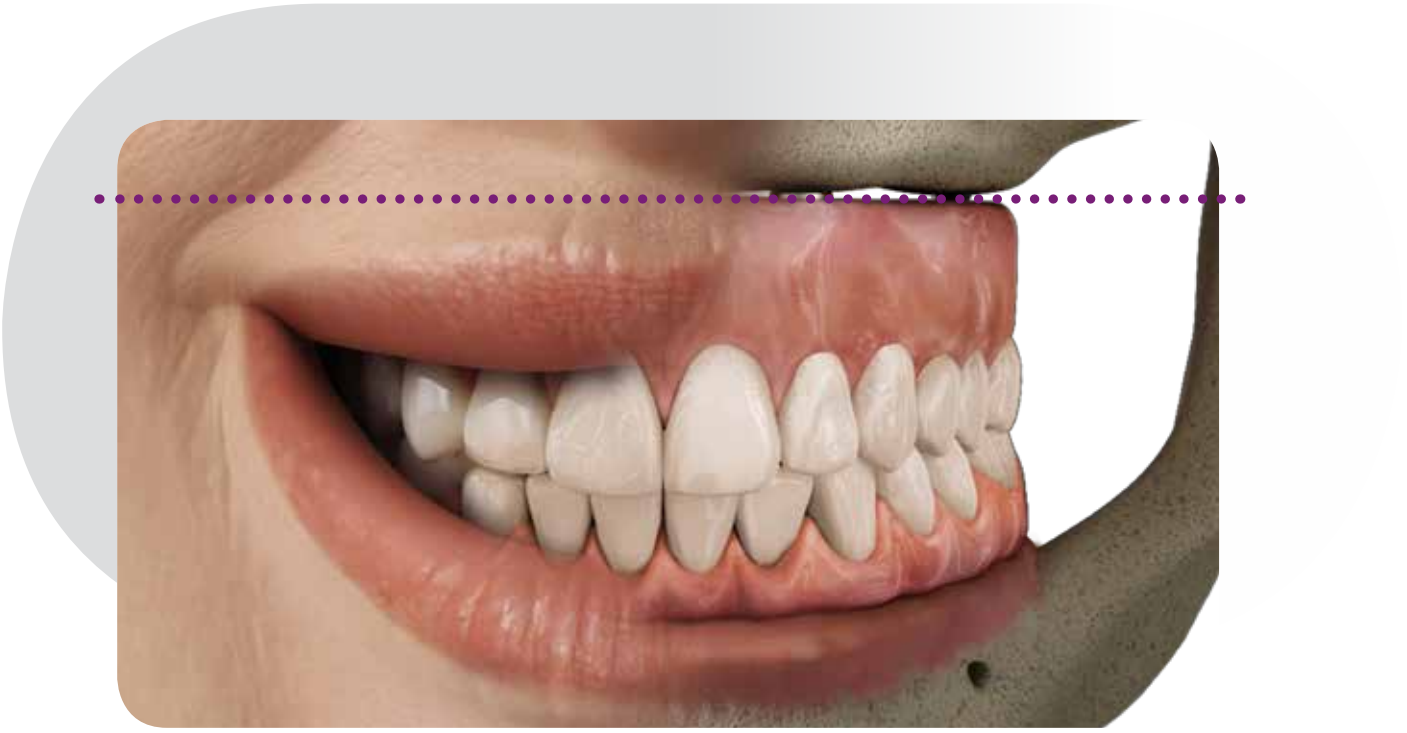


Fig 3. Rehabilitation extension according to patient's structures.

The upper lip defines the patient's smile line and the contact between bridge and remaining mucosa should never be exposed, otherwise there will be esthetic problems in the final restoration. The upper lip must cover the transition line between bridge and remaining mucosa independent of the residual bone structure.

During the planning stage, it is important to evaluate the volume of patient's residual alveolar bone.

VOLUME OF RESIDUAL ALVEOLAR BONE

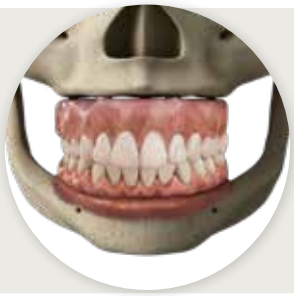
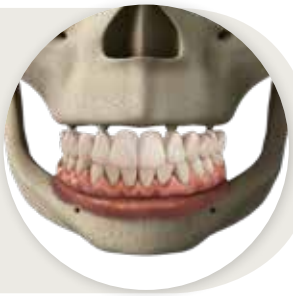
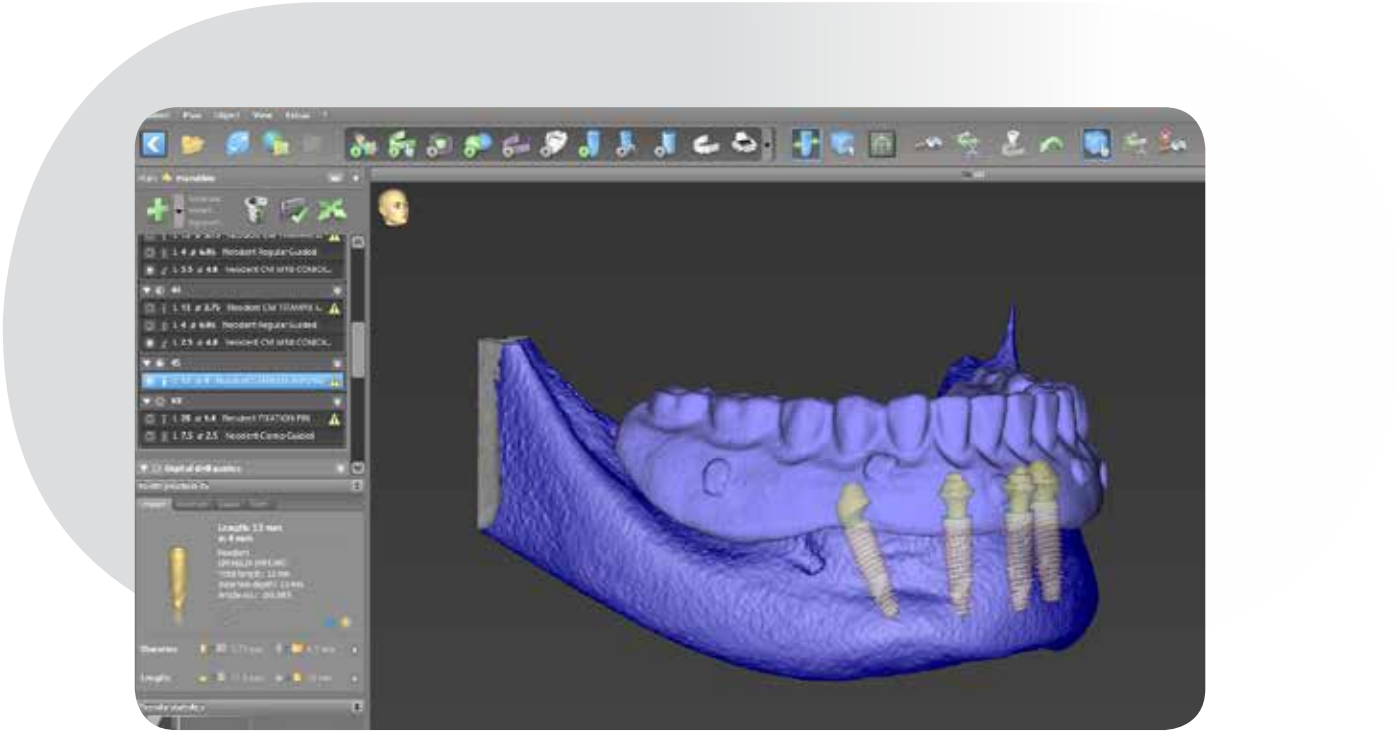
	small	mid	high
BEFORE			
Indication for horizontal osteotomy	Not indicated if the bone is in harmony with the upper lip and even.	Indicated to flatten the bone to avoid esthetics and functional problems.	Not indicated if the bone is in harmony with the upper lip and there is prosthetic space for the 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 extrusion and smile line after osteotomy for fixed full-arch rehabilitation.

2. Digital 3D Planning

For a successful restoration, 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 length and position of implants, and takes into consideration anatomical structures, especially for complex rehabilitation (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.



*Data extracted from coDiagnostiX® software.
*Patient treatment data authorized for publish.

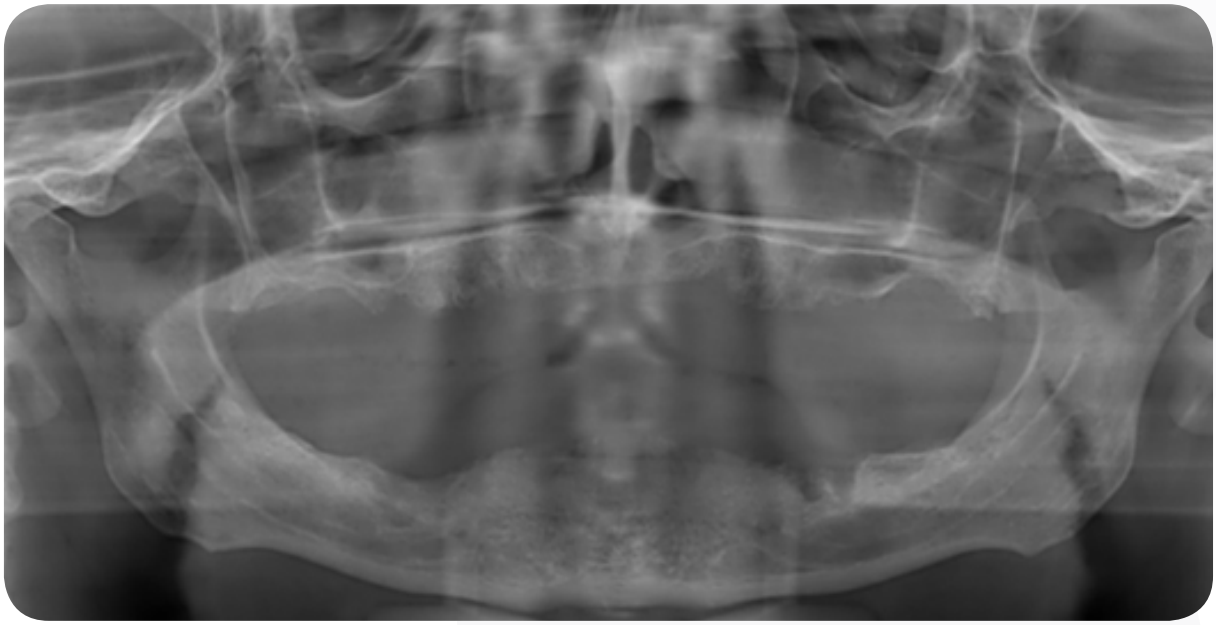
Fig 4. Implant distribution according to bone availability and prosthetic planning.

3. Implant Distribution and Prosthesis Definition

Implant distribution is an important factor to be considered in full-arch restorations as it supplies mechanical result on the system. Anteroposterior implant placement and occlusion should be balanced to avoid stress concentrations[1]. Bone condition, such as density, thickness, and anatomical structures are responsible for the implant distribution planning. Therefore, the posterior maxilla is considered the most difficult and problematic intraoral area for treatment with osseointegrated implants, presenting deficient bone quality and quantity, surgical access, and biomechanics (greater masticatory forces)[2].

For extremely atrophic ridges in maxillary bone, implant placement on denser cortical bone such as zygomatic regions can provide adequate implant support and eliminate procedures such as sinus augmentation, supplemental bone block grafts, and the use of a large number of implants[3].

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).



*Patient treatment data authorized for publish.

Fig 5. Panoramic radiography of an edentulous patient.

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

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 nasal cavity and sinus 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.

ZYGOMATIC GM™ IMPLANTS

In a clinical scenario of severe maxillary osteomalacia, atrophy, surgical resection, or trauma, conventional implant placement may require different approaches. The resorption of the maxilla in a posterior/superior direction results in a smaller osseous base that necessitates a larger volumetric replacement of the denoalveolar complex, added to the possibility of complications from sinus disease and enlarged pneumatized sinuses may create the need for multiple grafting procedures to develop suitable osseous tissue and may not present the most desirable pathway for patients.

The use of zygomatic implants is designed to reduce the need of bone block grafts, reducing the healing period and consequently clinical time for final fixed restoration. The installation protocol implies in the placement of two zygomatic implants and additional implants in the anterior maxilla splinted together, to support a screw-retained fixed dental prosthesis.

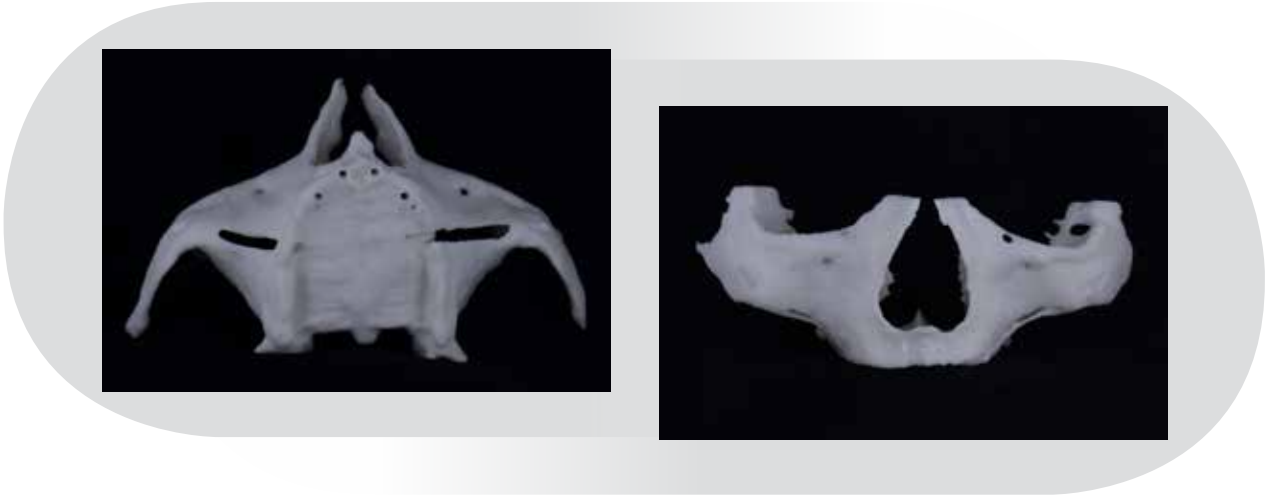


Fig 6. Illustration of anatomical structures.

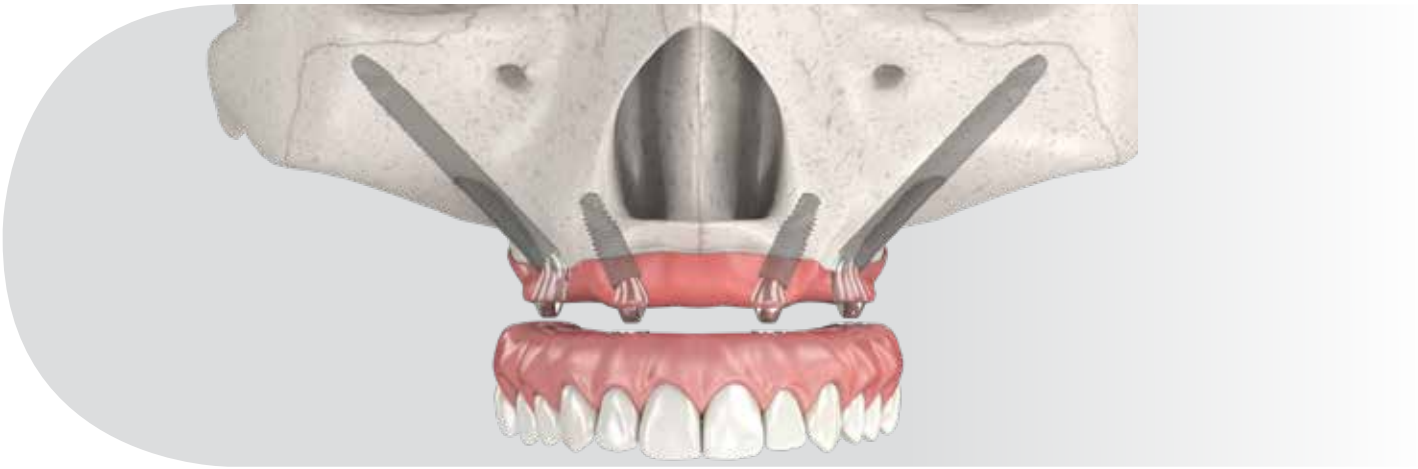


Fig 7. Implant positioning on a full-arch rehabilitation with 2 Zygoma GM™ implants and 2 regular GM™ Helix™ implants.

Implant for zygomatic anchorage

Indicated for surgical placement in the zygoma region, in cases of severe bone jaw resorption, in order to restore patient esthetics and chewing function. Zygomatic Implants are recommended for the posterior maxilla region. Neodent® Zygoma GM™ Implants may be loaded immediately when good primary stability is achieved and with appropriate occlusal loading.

- *GM™ prosthetic connection;*
- *Diameter of 4.0 mm;*
- *Lengths from 30.0 to 55.0 mm;*
- *Tissue with protect portion without threads near to the cervical region;*
- *Special Lateral direction drill designed to avoid soft tissue damaging;*
- *Neoporos Surface;*

	30.0 mm	35.0 mm	37.5 mm	40.0 mm	42.5 mm	45.0 mm	47.5 mm	50.0 mm	52.5 mm	55.0mm
Ø4.0 mm	109.1049	109.1050	109.1051	109.1052	109.1053	109.1054	109.1055	109.1056	109.1057	109.1058

Table 2. Zygoma GM™ implant lengths.

Surgical procedures and implant placement

There are specific techniques used in order to promote zygomatic implants installations on the atrophic maxilla. From conventional through the full exterior implant position, or the Stella Sinus Slot technique[4], the surgical approach is considered advanced and requires a specific dental training program.

Due to the long drilling distance to the zygomatic bone and in order to protect critical adjacent anatomical structures, placement of zygomatic implants requires considerable surgical training and experience diagnostic planning. To receive an adequate overview over the anatomical structures, presurgical 3D planning with Cone Beam Computer Tomography (CBCT) scans and a biomodel is strongly recommended.

The drills have longer lengths when compared to drills for conventional implants. The set of drills for implant placement is composed of six drills; one for a guided surgical procedure, one for the exteriorized technique and the others to complete the procedure.

	Ø2.35*	Lateral directional Ø4.0	Pilot Ø2.3/3.2	Ø3.75	Ø4.0
	103.455	103.458	103.465	103.456	103.457
Ø4.0 mm	✓	Optional	Optional	✓	✓

* Drill available for both conventional and Guided Surgery procedures.

Table 3. Zygoma GM™ drill sequence.

When performing the technique of implantation in the extra-sinus, zygomatic[5] (Fig 8) implant insertion should be guided by the local anatomical conditions, respecting the integrity of the infraorbital nerve, the orbit and the infraorbital fossa. The osteotomy should be performed as posteriorly as possible, maintaining a safe distance of 3 mm from the posterior vertical border of the zygomatic bone. When the trajectory of the zygomatic implant is visualized, surgical drills should be used to create a canal from the residual ridge and continue on the buccal surface of the maxillary body.

Fig 8.

Once the sinus membrane is exposed, manual instruments should be used to push it inward in order to preserve its integrity and create space for the drills. Zygomatic implants should be placed in a space created between the membrane and the zygomatic bone, with its body located in the sinus cavity. Neodent® developed The Lateral Direction Drill specially to respect soft tissue, avoiding tissue damage (Fig 9).

Fig 9.

The position of the platform regarding the residual ridge should be determined by the surgeon according to prosthetic needs. With this technique, posterior implants usually emerge at the level of the second premolar, while the anterior ones lie on the level of the lateral incisor (Fig 10).

Fig 10.

Prosthetic options and procedures

Abutment selection, provisional, and final restoration

Zygomatic implant placement over the crest ridge allows traditional prosthetic reconstruction, in contrast to the challenge of palatally positioned implants. For extreme angled positions, the GM™ Mini Conical Abutment provides 45° of inclination. With the available gingival heights of 1.5 or 2.5 mm. Thus, the use of the angle measure helps to select the proper abutment angle according to the alveolar ridge (Fig 12).

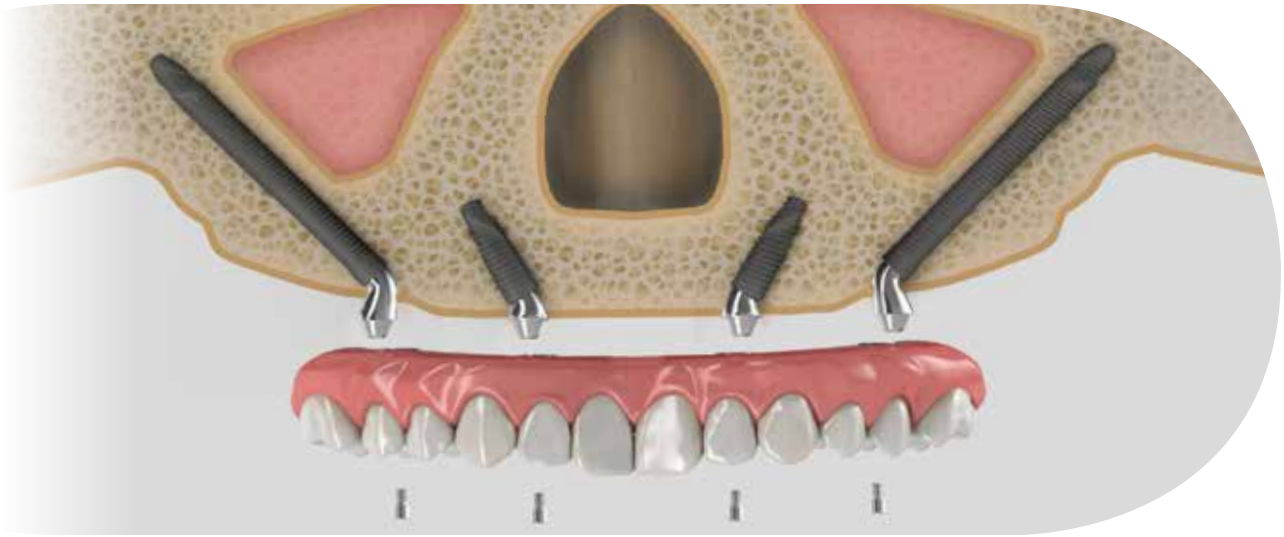


Fig 12.

GM Exact Mini Conical Abutment

	17°	30°	45°*
1.5 mm	115.249	115.252	115.267
2.5 mm	115.250	115.253	115.268
3.5 mm	115.251	115.254	

*The 45° Mini Conical Abutment is indicated for use only with Zygoma GM™.
Table 4. GM Angled Mini Conical Abutment.

GM Angle Measurer

17°	30°	45°
128.032	128.033	128.034

Table 5. GM Angle Measurers.

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 NeoTorque Connection (Fig 13). 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.

Fig 13.

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 NeoTorque Connection and remove the tray. For easy abutment identification, include the analogs when you send the dental impression to your dental lab partner (Fig 14).

Fig 14.

3. Fabricate the master cast with stone type IV (Fig 15) 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.

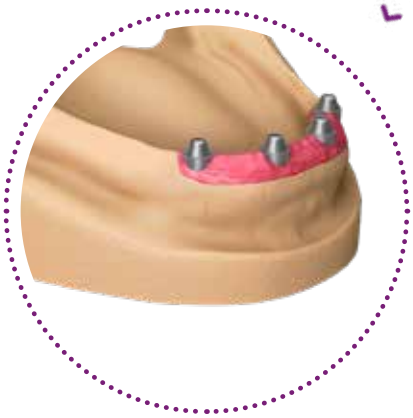


Fig 15.

Immediate provisionalization

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 TEMPORALIZATION are indicated:

Fig 16.

1. Promote lingual wear on the conventional complete denture preserving the buccal and posterior region integrity (Fig 16).

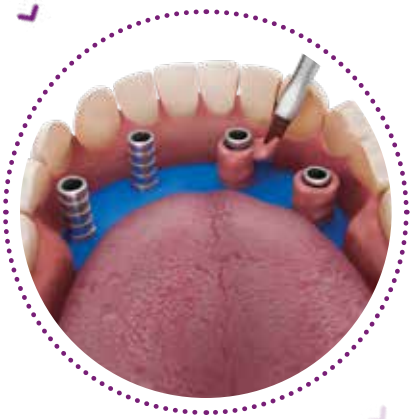


Fig 17.

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 17). Apply pink acrylic resin around the copings. Patient should be in occlusion to stablish a proper central relation between arches.

Fig 18.

3. Finalize and polish the temporary restoration. Place the temporary restoration in the patient's mouth and tighten the occlusal screws to 10 N.cm using the Neo Screwdriver (Fig 18).

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 19). Wax-up the bar-framework according to the availability of patient interocclusal space.

Fig 19.

2. Cast the bar and check its alignment over the model (Fig 20). 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 the One step hybrid technique, cement the structure over titanium copings.

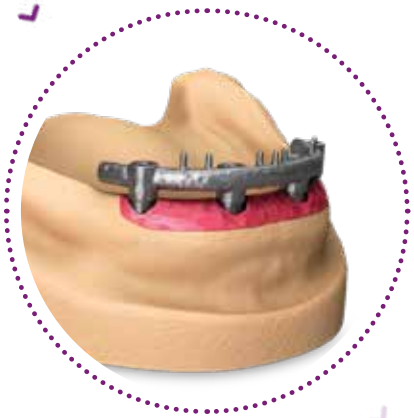


Fig 20.

3. Produce the final restoration based on the custom-milled framework. Install final complete fixed restoration on the patient's mouth (Fig 21).

Fig 21.

Final Restoration – Digital

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

Fig 22.

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 22).

Fig 23.

2. Scan the plaster model set with the help of a scanner and design the framework in CAD software (Fig 23).

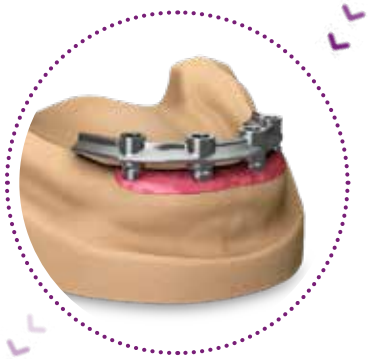


Fig 24.

3. Produce the final restoration based on the custom-milled framework (Fig 24).

Fig 25.

4. In the dental office, place the final restoration into the patient's mouth (Fig 25).

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.

In maxilla planning, the cantilever should extend only for the 1st molar. Anterior implants can be located at the lateral incisor or canine region[1] (Fig 26).

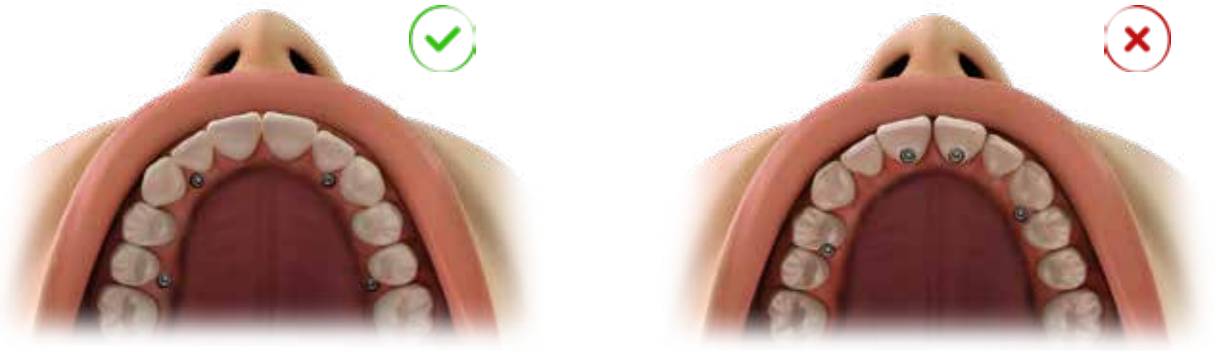


Fig 26. Proportion and relation of implants positioning and size of cantilever.

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

ZYGOMA GM™ IMPLANT PACKAGING

Neodent® packaging has been specially updated for easy handling and safe surgical procedures, providing safety from implant stocking to the capture and transport to implant placement. The implant's features, such as type, diameter and length, are identifiable on the outside of the packaging.

Three self-adhesive labels are provided for recording in the patient's medical records and for reporting to the prosthetic team. This also allows for traceability of all articles.

After opening the blister, note that the implant will remain attached at the lid. In order to break the base holder of the implant, hold the lid and apply a contra-torque with the GM Connection for contra-angle (a maximum torque of 20 N.cm). Or for manual installation, use the Zygoma GM™ Implant Driver with the Neo Screwdriver Torque Connection. Finish the implant placement with the aid of the Torque Wrench.

Fig 11. Instructions for opening and carrying the implant packaging.

Note: The holder is integrated to the implant body, but is designed to be removed from the blister without any apical burr.

COMPREHENSIVE RESTORATIVE SOLUTIONS: DESIGNED TO MEET THE PATIENTS' 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 material and any workflows.

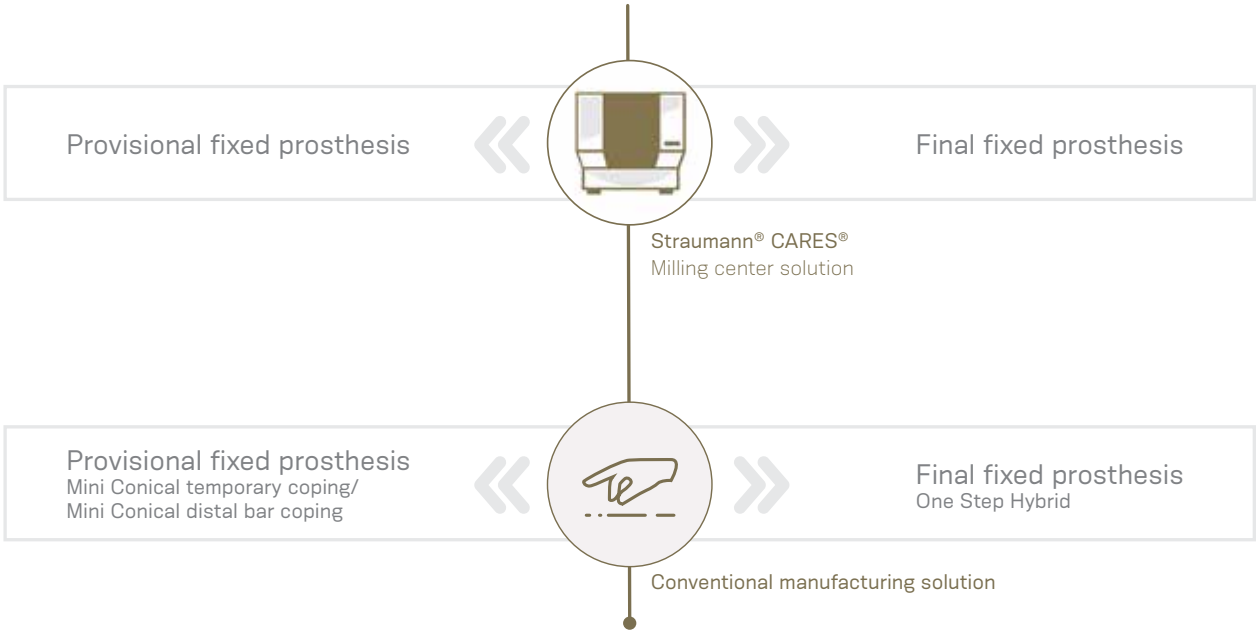


Table 6. Framework for provisional and final fixed prosthesis.

Fig 27. Illustration of final prosthesis on a milled bar.

FOLLOW-UP

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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www.neodent.us

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
www.straumann.us • www.straumann.ca

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