

Consensus Regarding 16 Recognized and Clinically Proven Methods and Sub-Methods for Placing Corticobasal® Oral Implants

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Abstract

This Consensus-Document is issued by the International Implant Foundation (Munich/Germany). It describes distinct methods of placement of cortico-basal oral implants in different areas of the jaw bone and the maxillo-facial skeleton. The implants utilize the method of "osseofixation" instead of "osseointegration" for achieving primary, functional stability, hence they work according to the (AO-) principles of fracture treatment. The concept of the technology allows for immediate functional loading, just as it allows for various types of loading following orthopaedic surgery. The 16 methods and sub-methods as described and displayed here have been undergoing extensive observation and testing and they have been approved by the Board of the International Implant Foundation. All Consensus Documents of the International Implant Foundation are revised every three years. This is the 3rd version of the Consensus Document on placement of corticobasal oral implants

Level of Evidence: S3 (evidence based, systematically developed consensus guideline).

Keywords: Cortical anchorage, corticobasal implantology, immediate functional loading, polished implant surface

INTRODUCTION

In an effort to define standardized treatment methods, the International Implant Foundation (Munich, Germany) publishes this consensus document on 16 clinically successful anchoring techniques for corticobasal oral implants. This consensus document describes only the proven methods,^[1] without recommending a specific number of implants per jaw or per segment. It is understood, however, that the number of implants used will be typically higher compared to treatment plans in conventional dental implantology. Level of evidence – S3 (evidence-based, systematically developed consensus guideline). Other applicable rules and documents are as follows: General rules for treatments in the field of traumatology and orthopedic surgery.^[2] Indications and treatment modalities with corticobasal jaw implants. IF Consensus Document 2019. *Ann Maxillofac Surg* 2019;9:379-86.

GENERAL METHODS

Methods 1

Method 1a

Multidirectional insertion of implants, where implants are

inserted (wherever possible) at an angle to each other. To allow the insertion of prosthetics, the following steps are then performed:

- The abutment heads are parallelized by bending the shafts of the implants to accommodate the prosthetic restoration or
- Angulation adapters (as intermediate elements) are cemented or
- By grinding the big abutment heads
- Prosthetic constructions and implants are connected by prosthetic screws (for the multiunit design of Corticobasal® implants).

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Method 1b

Stability is achieved through mandatory placement of implants in cortical engagement at least in the strategic positions. Placement of additional supporting implants for stabilization.

- Full penetration and anchorage in the second or third cortical^[3] (i.e., not just support by the cortical) of the force-transmitting threads in the cortical is (in most areas of the jaw bones) mandatory. As a result, both extrusive and intrusive forces are transmitted into the cortical bone.

Method 1c

Anchoring the implants in the second and possibly third cortical bone layers, independently of the alveolar bone. Cortical areas that are resistant to resorption are preferred.

Method 1d

Placement of Corticobasal[®] implants in cases with severe and active periodontal involvement. Under the protection of strong topical disinfection agents, the teeth and subsequently the periodontally involved soft tissues are removed. Corticobasal[®] implants are placed instantly, and they are then splinted by a rigid construction.^[4]

Method 1e

Spongy, alveolar bone areas are avoided for anchorage. Achieving “osseointegration” is not the primary aim of the treatment with the Corticobasal[®] implant. Corticobasal[®] implants are osseofixed in corticals and then splinted by a rigid construction.

Method 1f

Fixation of polished implant bodies made from implantable material with the aim of achieving mechanical anchorage in the cortical bone areas of the maxillofacial skeleton. Subsequent splinting by the prosthetic construction in an immediate loading protocol.

Method 1g

Creating antirotation features for an implant by bending intraosseous parts of the shaft of the implant.

Method 1h

Achieving primary stability by vertical condensation of the spongy bone by wide-body Corticobasal (R) implant.

SITE-SPECIFIC METHODS

Method 2

Placement of implants between the mental nerves (in edentulous mandibles) with or without utilization of the caudal cortex of the mandible.

The threads of the implants are inserted in the direction of the chin, which prevents damage to the mental nerve. Typically, two implants are used on each side of the mandible.

Only if the bone of the anterior mandible exhibits insufficient mineralization, the caudal cortex can be used for anterior anchoring.

Method 3

Anterior anchorage of segmented bridges with insertion of one or two long Strategic Implants[®] in the gap between the root of the canine and the mental foramen. The threads of the implant extend below the root of the canine. The implant will extend to, and can be anchored in, the caudal cortical bone of the mandible to the extent necessary to achieve stability.

Method 4

Method 4a

Nerve bypass – Endosseous positioning of the Corticobasal[®] implant inside the distal (proximal) mandible, by bypassing the inferior alveolar nerve on the lingual or vestibular side, if necessary/possible by anchorage in the caudal cortical bone, but without penetrating with the apex of the implant through the cortical.

Method 4b

Nerve bypass – Endosseous positioning of the Corticobasal[®] implant inside the distal (proximal) mandible, by bypassing the inferior alveolar nerve on the lingual or vestibular side, if necessary/possible by anchorage in the caudal cortical bone, with penetration of the apex of the implant through the cortical.

Methods 5

Method 5a

Lingual cortical anchorage in the distal mandible – Implant placement with anchoring the load-transmitting threads in the lingual bone undercut, below the mylohyoid ridge (where applicable, with the aim to achieve truly penetrating anchorage). The apical thread of the implant must be fully anchored in the lingual cortical, and it may partly overproject this cortical into the floor of the mouth.

The inferior alveolar nerve will run caudally to the implant body. As a rule, two or more such implants are placed distally to the mental nerve (i.e., in the proximal, horizontal part of the mandible). Typically, the inclination of the heads of these implants (before bending) is toward the anterior implants.

Method 5b

Vestibular cortical anchorage in the distal mandible – Implant placement with anchorage in the vestibular cortical bone and crestal to the inferior alveolar nerve.

Method 5c

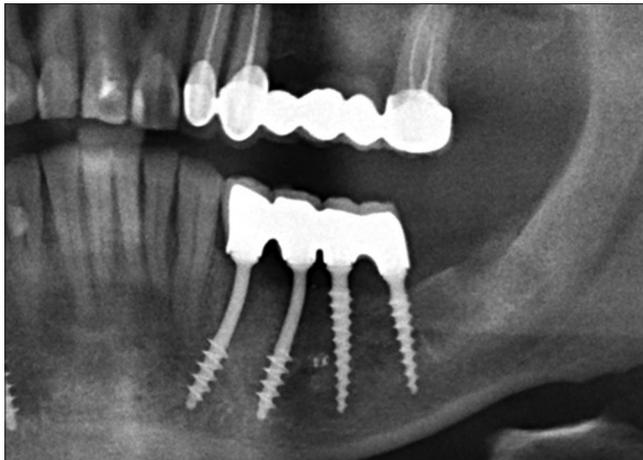
Vestibular cortical engagement in the distal mandible, with the implant running below the mandibular nerve – This method is used if the inferior alveolar nerve is located crestally, and if the distal mandible is wide and high enough to allow this type of placement.

Method 6

Placement of a Strategic Implant[®] with the aim of a palatal/lingual and vestibular support reaching the cortex without utilizing the second cortical bone layer in a vertical direction. Main areas of application are as follows:



Method 1: (a) Corticobasal® implant with an apical cutting thread and a polished shaft. This abutment head features a multiunit design, and it is designed for a screw connection to prosthetics. (b) Corticobasal® implant with an apical cutting thread and a polished shaft. This abutment head is designed for cementing



Method 3: Placement of implant(s) in the gap between the root of the canine and the mental nerve, with the implants reaching far deeper (caudal) than the root of the canine

- Extraction sockets of the mandibular and maxillary premolars
- Lower and upper anteriors
- Tuberosity of the maxilla.

Methods 7

Method 7a

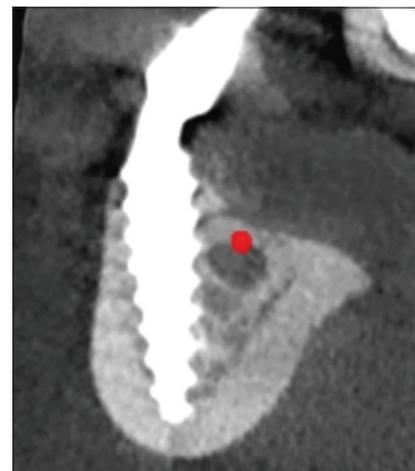
Penetrating anchorage of implants in the bony nasal floor – The implant is inserted through the maxillary alveolar bone. This technique can include the penetration of the mucosa of the nasal floor, with the result that the polished implant tip and eventually also a part of the thread can extend slightly into the lower airway.

Method 7b

Implant placement on the palatal side of the severely horizontally atrophied alveolar bone (knife-edge maxilla)



Method 2: Converging placement of four Corticobasal® implants in the interforaminal region of the mandible. This way of placement ensures safety for the mental nerve, optimum utilization of the corticalized bone inside the anterior mandible (without a necessity of utilizing the basal [2nd] cortical in this region), a reduction of the bridge span in the direction of the implants which are going to be placed more distally (i.e., in the proximal mandible)



Method 4: Nerve bypass, on the lingual or vestibular side of the nerve. With or without anchorage in the basal (2nd) cortical

without penetrating the alveolar bone and directly into the nasal floor. Method 7b is a special technique of application, based on Method 7a.

Methods 8

Method 8a

Use of the cortical floor of the maxillary sinus for penetrating implant anchorage.

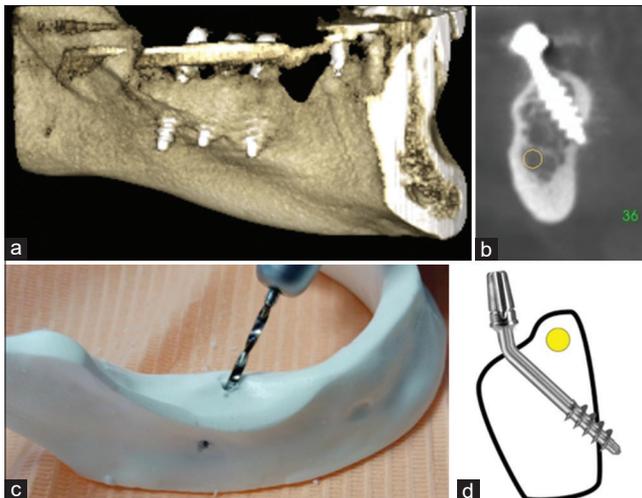
Method 8b

Utilization of an intrasinus septum for multicortical anchorage of a Strategic Implant®, including the penetration of parts of the implant's thread into the maxillary sinus.

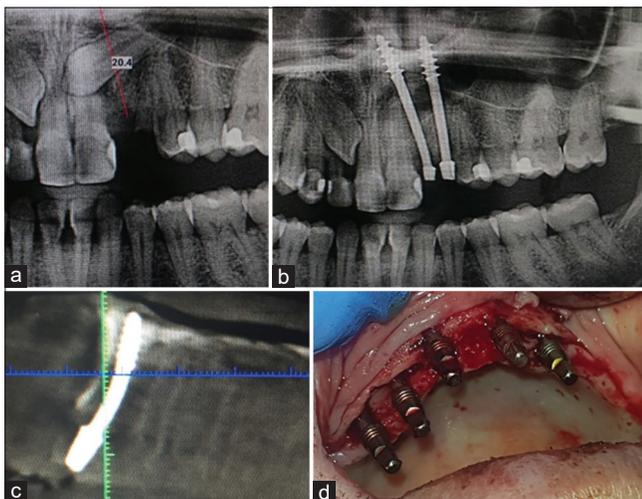
Method 9

Method 9a

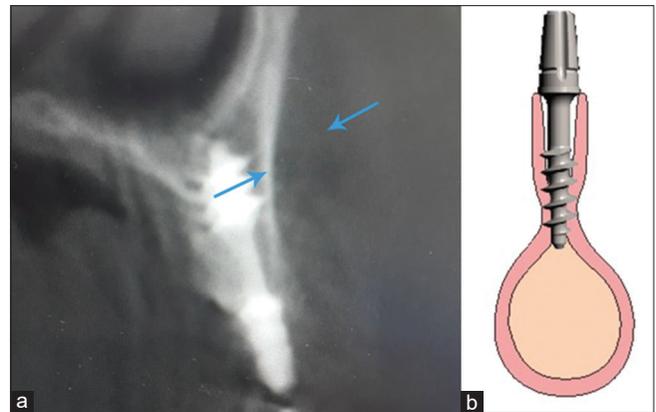
Bypassing the upper canine root – Anchoring an implant in the cortical floor of the nose, with the abutment head positioned in the region of the first or second premolar and the shaft of the



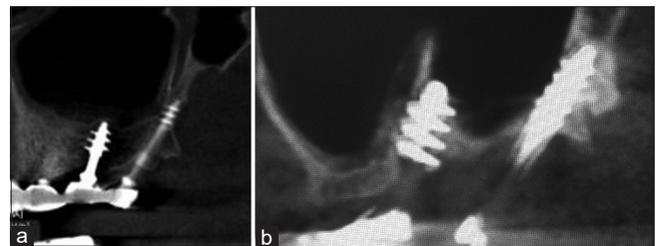
Method 5: (a) Lingual cortical engagement in the distal mandible, with the tips (and eventually also the threads of the implants penetrating through this cortical [and the lingual undercut] and into the floor of the mouth). (b) Lingual cortical engagement in the distal (proximal) mandible with the implant engaging into the 2nd cortical under a shape angle because the anatomy does not offer a lingual undercut. The head of the implant is more vestibular compared to the results after using Method 5b. The mandibular nerve runs below and lateral to the implant. (c) Vestibular cortical engagement, here, shown on a model. The drill penetrates the vestibular (2nd) cortical, and the position of the implant's head is more lingual compared to the results after using Method 5a. The mandibular nerve runs below and lateral to the implant. (d) In this variant of Method 5, the mandibular nerve runs above the implant. This method can be carried out in the lingual or in the vestibular direction, depending on the best access to the mandible



Method 7: (a) Panoramic view before surgery. (b) Panoramic view after surgery. (c) The implant bypasses the knife-edge ridge of the maxilla on the palatal side, and it engages right away into the floor of the nose. (d) View on the anterior maxilla after the placement of five corticobasal implants. The two implants on the position of the centrals are placed in Method 7a (into the alveolar bone), whereas the three implants which are positioned more laterally are bypassing the highly atrophied crest. They insert directly into the floor of the nose, Method 7b.



Method 6: (a) The implant is engaged into the vestibular and lingual cortical of the maxilla, without reaching the cortical of the floor of the maxillary sinus (as a 2nd cortical). The method is used often if earlier implants fail and the 2nd cortical in the axial direction is not available. The diameter of the implant is typically 5.5 mm or larger. (b) Method 6 is often used in the anterior mandible and skeletal Class 2 cases. These cases provide often a sand clock-shaped (anterior) mandible and the isthmus provides additional possibility as well as vertical support



Method 8: (a) The implant in the area of the 1st upper molar engages into the floor of the sinus as the 2nd cortical. (b) The implant in the area of the 1st upper molar engages into an intrasinus buttress as the 2nd cortical

implant bypassing the root of the canine on the palatal side. Method 9 is a special case of Method 7a or 7b.

Method 9b

Bypassing the upper canine root – Anchoring an implant in the median raphe of the maxilla, with the abutment head positioned in the region of the first or second premolar and the shaft of the implant bypassing the root of the canine on the palatal side.

Methods 10

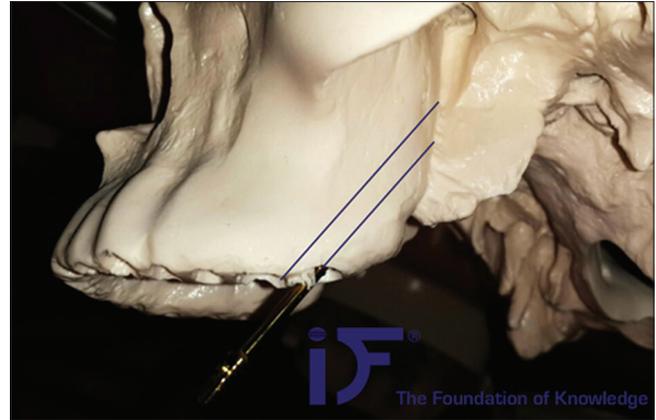
Method 10a

Placement of the apical thread of the implants into the cortical bone of the pterygoid plate of the sphenoid bone – Placement can be performed either directly into the pterygoid plate of the sphenoid bone or through the maxillary tuberosity and/or through the maxillary sinus.^[5]

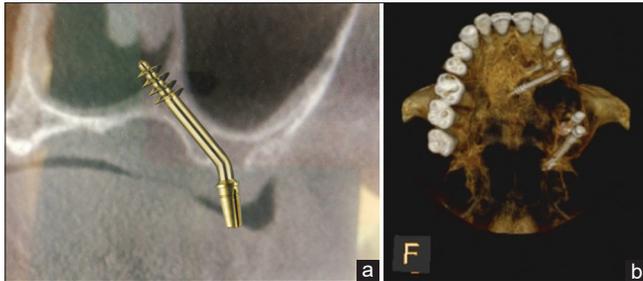
In an optimum end position, the apex of the implant penetrates the internal pterygoid muscle (between the wings of the pterygoid process) because this tends to increase the anchorage in the pterygoid plate through compression. For this method,



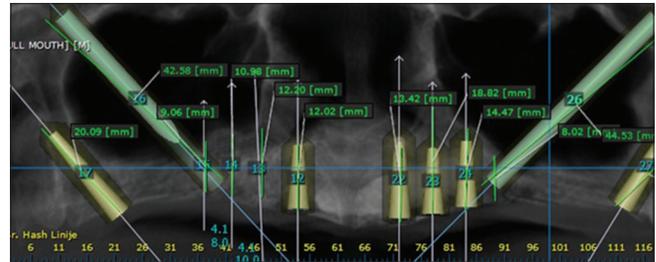
Method 9: Canine bypass. The implant is inserted in an oblique direction from the area of the 1st upper premolar, it is bypassing the root of the canine on the palatal side of the root, and it reaches the floor of the nose where it is anchored cortically



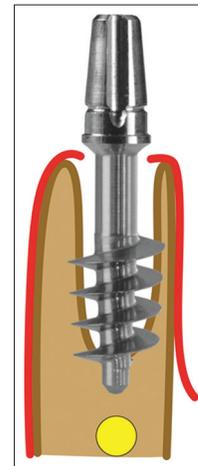
Method 10: One or two implants are inserted through the distal maxilla into the fusion zone between the distal maxilla and the pterygoid process of the sphenoid bone



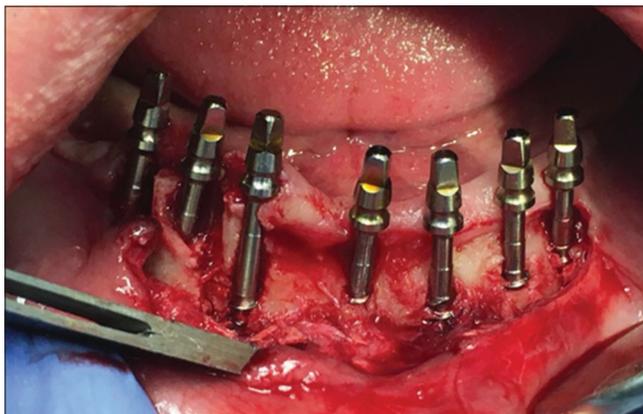
Method 11: (a) One possible variant of Method 11, with the implant projecting through the bone on the palatal side of the maxillary sinus and anchoring in the cortical floor of the nose. (b) This figure shows Method 11b, with the implant projecting through the bone or in a subperiosteal manner on the palatal side of the maxillary sinus, for anchorage in the median raphe of the maxillary bone



Method 12: The two long implants are anchored in the body of the zygomatic bone



Method 14: Engagement of the threads of the implants into the cortical of the extraction socket. The cortical on the left side of the picture (lingual) is considered a permanent cortical because the outer cortical of the mandible is identical to the lamina cribrosa of the extraction socket

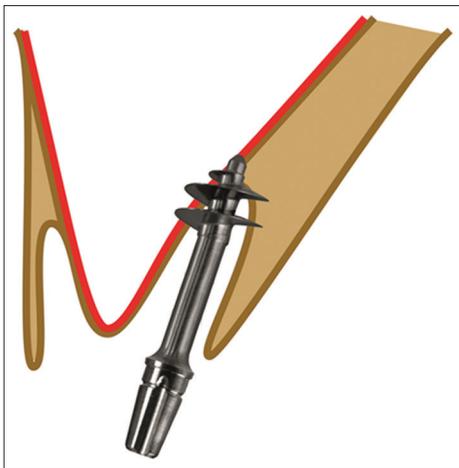


Method 13: Anchorage of the load-transmitting threads of the implants into the cortical base of the mandible if knife-edge ridges are present, which are larger than the implant. The vertical implant parts run vertically and subperiosteally. Implant length and abutments are placed with respect to a good possibility to provide prosthetic equipment.

Corticobasal® implants or designs which include compression threads are applied.

Method 10b

Double tubero-ptyergoid – Two parallel or slightly diverging implants are placed into the fusion zone between the distal maxilla and the sphenoid bone.



Method 15: Engagement of a corticobasal implant into the cortical of the palatal root of a 1st or 2nd upper molar. The implant should penetrate into the maxillary sinus for maximum retention and to show resistance against intruding and extruding forces

Methods 11

Method 11a

Anchorage in the bone on the palatal side of the maxillary sinus, without anchorage in the nasal floor or in the median raphe of the maxilla [Method 11].

Method 11b

Anchoring of the implant from lateral in the median raphe of the maxilla.

Method 12

Anchorage of the implant in the body of the zygomatic bone: Using a trans-sinusal procedure^[6] or inserting from caudal, directly into the body of the zygomatic bone.

Method 13

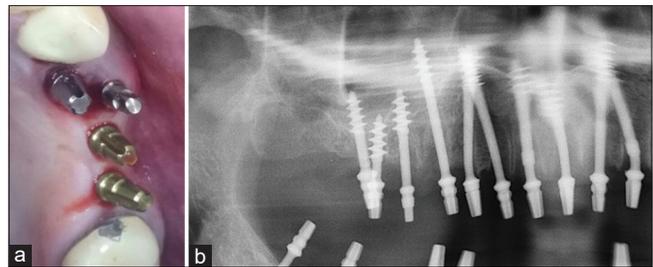
Placement of implants vestibular to the knife-edge ridge in the anterior mandible. The typical implant diameter is 2.7 mm or 3.0 mm. Anchorage in the base of the mandible. Vertical implant parts run partially subperiosteal. The anterior caudal cortex can be also used for such type of implant anchoring, however care must be taken not to damage closeby blood vessels, and a strategy for long-term preservation of the oral mucosa to cover the vertical implant struts must be applied.

Method 14

Anchoring an implant in the fresh extraction socket of the first or second premolar with at least mesial and distal cortical anchorage in the bone of the extraction socket. Utilizing the medial cortical of the mandible increases the anchorage.

Method 15

Anchoring a larger diameter implant into the fresh extraction socket of the palatal root of the upper first or second molar.



Method 16: (a) Two implants are placed into the extraction socket of a two-rooted 1st upper premolar. The implant on the palatal side is placed according to Method 9; the vestibular implant is placed in the vestibular socket of the root. (b) Two implants are replacing the 1st upper molar: the smaller implant inserts into the extraction socket of the palatal extraction root (4.6 mm in diameter), whereas the vestibular socket is equipped with a longer implant (3.6 mm in diameter)

Methods 16

Method 16a

Inserting two implants in the region of the upper first premolar, with one implant being placed palatally into the floor of the nasal cavity (Canine root bypass, Method 9), whereas the other implant is anchored in the region of the vestibular root of the first premolar.

Method 16b

Inserting two or three Corticobasal[®] implants in the region of the upper 1st or 2nd molar as an alternative to anchorage in the tubero-pterygoid region, in the event that Method 10 is not feasible.

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Conflicts of interest

There are no conflicts of interest.

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