

E-book



All-on-4®

TREATMENT concept

Real-life clinical
cases with tips
and tricks from
All-on-4® experts



Contents

Introduction	3
What is the All-on-4® treatment concept?	4
Why the All-on-4® treatment concept?	8
4 steps to help identify the right patient	12
Treatment planning: how to get started?	13
4 common challenges and how to avoid them	20
Expert clinical cases and what you can learn from them	22
References	32

Introduction

What this e-book is about

The All-on-4® treatment concept has been around for nearly two decades. In that time, it has been used to treat thousands of edentulous and soon-to-be edentulous patients. It offers unique advantages over traditional treatment options for both patient and clinician.

We've created this e-book so you can find out whether the All-on-4® treatment concept is right for your practice. If you come to the conclusion that it is, then the following chapters will help you understand how you can get started, covering everything from treatment planning considerations to real-life clinical cases.



Important safety information

Treatment with dental implants is a surgical procedure and requires prior evaluation by your dentist to make sure your dental and general health permits dental implant treatment. Placement of dental implants is done during a surgical procedure, which has associated general risk, including infection, possible damage to nerve tissue, and excessive bleeding during or after the surgery. Consult your clinician to find out if dental implants are the right option for you.

What is the All-on-4® treatment concept?

The All-on-4® treatment concept is a cost-efficient, graftless solution that provides patients with a fixed full-arch prosthesis on the day of surgery.



- 1 Full-arch rehabilitation with only four implants:** Two axial anterior implants and two implants tilted up to 45° in the posterior.
- 2 Immediate Function** (Fixed acrylic bridge) for patients meeting criteria for immediate loading of implants.
- 3 A graftless procedure**

A significant number of patients treated with the All-on-4® treatment concept have a failing dentition.

"Two thirds of patients treated in our practice with a full-arch restoration are soon-to be edentulous."

Dr. Wolfgang Bolz, Germany

How is it possible?



By tilting the two posterior implants, the bone-to-implant contact is enhanced, providing optimized bone support even with minimum bone volume. Additionally, tilting of implants in the maxilla allows for improved anchorage in better quality anterior bone. Furthermore, the implant design from Nobel Biocare allows bicortical anchorage in the cortical bone of the sinus wall and the nasal fossa.

Tilting of the posterior implants also helps avoid vital structures and results in a better distribution of implants along the alveolar crest, which optimizes load distribution and allows for a final prosthesis with up to 12 teeth.

Nobel Biocare offers straight as well as 17° and 30° angled Multi-unit Abutments for all Nobel Biocare implants. The abutments are available with various collar heights to match the thickness of the soft tissue.

With the All-on-4® treatment concept, patients that meet the criteria for immediate loading can also benefit from an immediate implant-supported all-acrylic restoration, as a provisional prosthesis is screwed onto the implants right after surgery. Final solutions include both fixed and fixed-removable prostheses.

Why it's popular with patients

Restoring more than a smile

The All-on-4® treatment concept provides edentulous and soon-to-be edentulous patients with a fixed full-arch prosthesis on four implants on the day of surgery. This quickly leads to improved patient satisfaction with regards to:

- Function
- Esthetics
- Sense
- Speech
- Self-esteem

This makes it an attractive and potentially life-changing treatment option for patients.

Shorter time-to-teeth

Two key elements significantly reduce treatment complexity, the number of surgeries, and the overall treatment time:

- 1 Tilting of the posterior implants avoids the need for time-consuming bone grafting procedures
- 2 Immediate loading with a fixed provisional prosthesis shortens time-to-teeth²

Lower costs

The All-on-4® treatment concept is not only the least time-consuming treatment option, it's also the least costly in comparison with conventional implant treatment methods for the edentulous and soon-to-be edentulous jaw using two-stage surgery.³

This is why 98% of patients would recommend the All-on-4® treatment concept as one study showed.²

"For much of my life, I suffered from gum disease, bone loss and unstable teeth. I was very self-conscious about my situation and thought that there was no solution to my problem. I cannot believe the difference All-on-4 has made in my life."



Carole Lane, UK

Why the All-on-4® treatment concept?

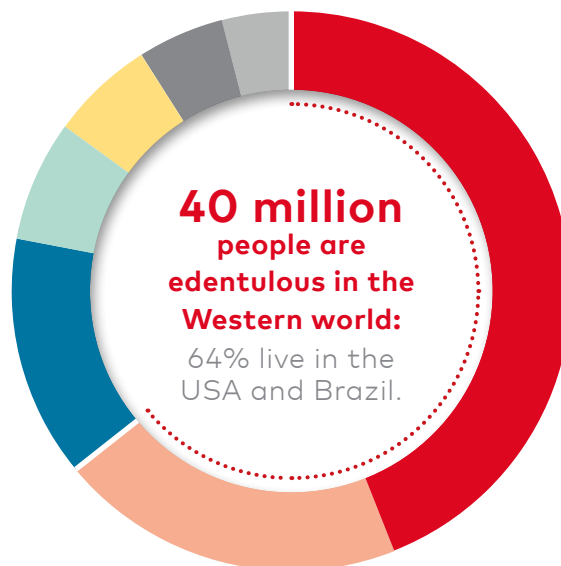
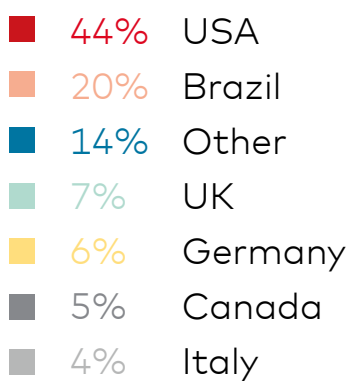


Failing dentition: An indication

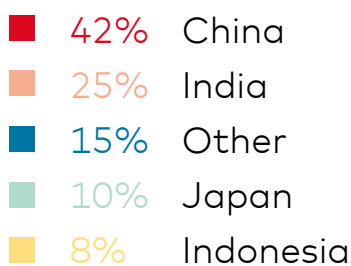
Failing dentition is a very common condition and there is a great need for a wider variety of solutions to treat this diverse group of patients. It represents a global health care burden, and will continue to do so for the foreseeable future.

The demand for treatment extends to millions of edentulous people – more than 40 million in the Western world, and 250 million in Asia. Of the total population worldwide, around 6–10% are edentulous and even more are soon-to-be edentulous.*

Western world



Asia

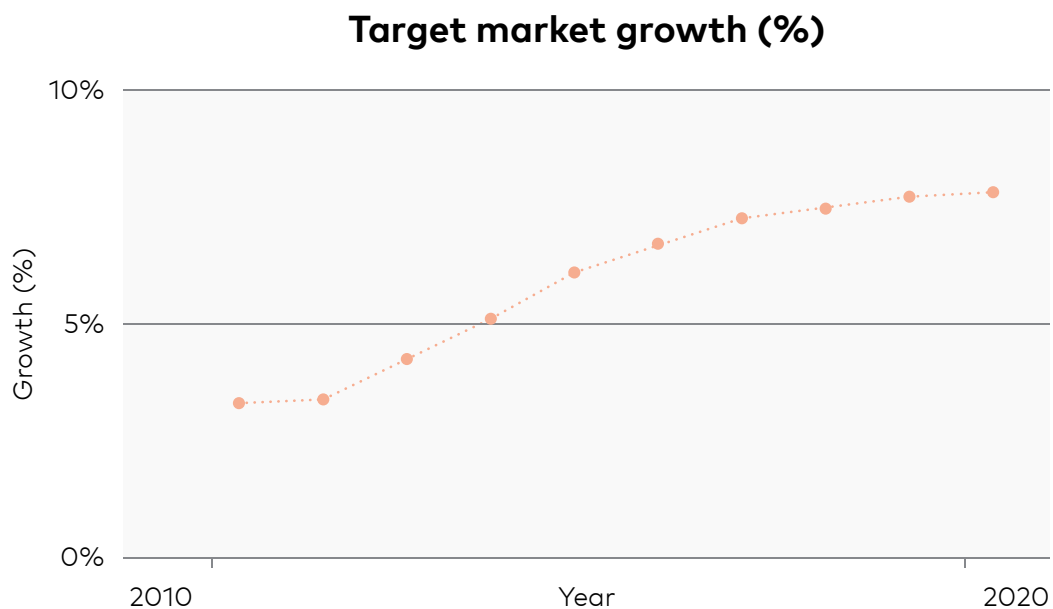


* Source:
Supplement to: GBD 2016 Disease and Injury
Incidence and Prevalence Collaborators.
Lancet 2017;390(10100):1211–1259

Implant-based solutions

The global implant-supported overdenture market is expected to see 6% annual growth for each of the next five years.¹

The main driver of this growth is that patients are increasingly aware of various dental implant restorations. Another factor is that over the last decade the percentage of people over the age of 65 in regions such as Europe and the United States has been increasing annually and will continue to increase as the baby boomer population ages.



Source: Delta Research Inc. 2014

A solution to a problem

Even decades after dental implant placement became an established method for restoring quality of life, many of those most in need of help were unable to benefit.

With such patients suffering from moderate to severe bone resorption, finding adequate bone to place implants is a challenge. There are financial considerations too, as placing enough implants to restore a whole jaw could be cost prohibitive for many patients.

A new solution was needed and Dr. Paulo Malo found it. In 1998, Malo successfully treated the first patient with the All-on-4® treatment concept. Since then, hundreds of thousands of patients have been treated with the All-on-4® treatment concept using Nobel Biocare implants.

But what exactly makes the All-on-4® treatment concept so popular with both clinicians and patients? In the next few chapters we'll explore what makes the concept unique and how it meets patient needs.

4 steps to help identify the right patient

A thorough evaluation is necessary in order to choose the right treatment and to establish a predictable treatment outcome. To begin the evaluation you can consider the following:

1 Medical history, chief complaint and patient expectations

Any conditions that might affect the patient's treatment outcome, or their suitability for a surgical procedure should be noted. The patient's expectations should also be discussed and recorded.

2 Dental history

Understand the patient's expectations, and history with dental failure (e.g., periodontal disease) as well as admitted or known habits including clenching and bruxing.

3 Radiographic analysis

Initial radiographic evaluation can be done with the help of a panoramic radiograph (OPG). The practitioner then decides if a full-mouth periapical series (FMX/FMS), a medical CT scan or a (CB)CT (cone beam CT) analysis is needed before the final decision.

4 Intra- and extraoral examination

Evaluate the condition of the remaining teeth, documenting caries, occlusion, occlusal discrepancies and migration of teeth. For patients with remaining teeth, the oral examination is always based on periodontal findings and the disease status of the remaining teeth and soft tissue. For both patients with partial and complete edentulism, the general and specific soft tissue conditions should also be documented.

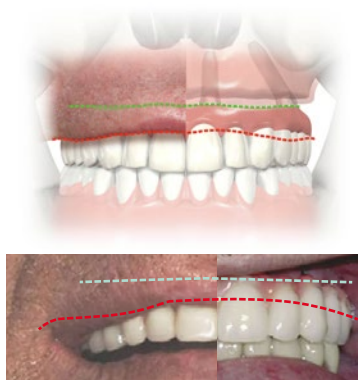


Treatment planning: how to get started

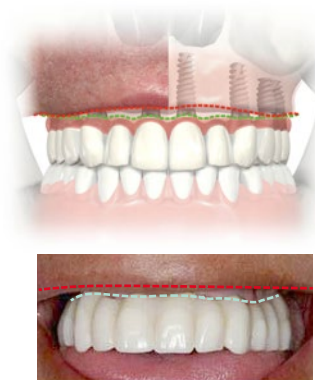
Treatment planning has to start with the restoration in mind. Once this is done, the quantity of bone and available bone zones is evaluated.

As part of a systematic patient evaluation the following information can also be helpful:

- 1 **Reviewing the presence or lack of hard and soft tissue** can help to determine the type of final prosthesis needed.
- 2 **Identification of a transition line** can help to determine potential esthetic considerations and needs.⁴



Transition line (in green) is apical to the smile line (in red) with an esthetic outcome.



Transition line (in green) is coronal to the smile line (in red) with an unesthetic outcome.

- 3 **Evaluating maxillary zones** can help you to select a particular surgical and restorative treatment protocol. More information to follow in the next chapter.
- 4 **Considering the use of 3D software** is also recommended for evaluating the potential sites for implant placement.

Based on the information obtained, a diagnosis can be made.



Dr. Jivraj, a leading prosthodontist from United States and All-on-4® treatment concept expert, suggests the following seven diagnostic factors to help you determine if the patient is a candidate for a fixed or removable restoration:

- Incisal edge
- Restorative space
- Lip support
- Smile line
- Contours
- Tissue surface
- Occlusion

You can learn more about these seven diagnostic factors in our new online course: info.nobelbiocare.com/en/all-on-4-online-course

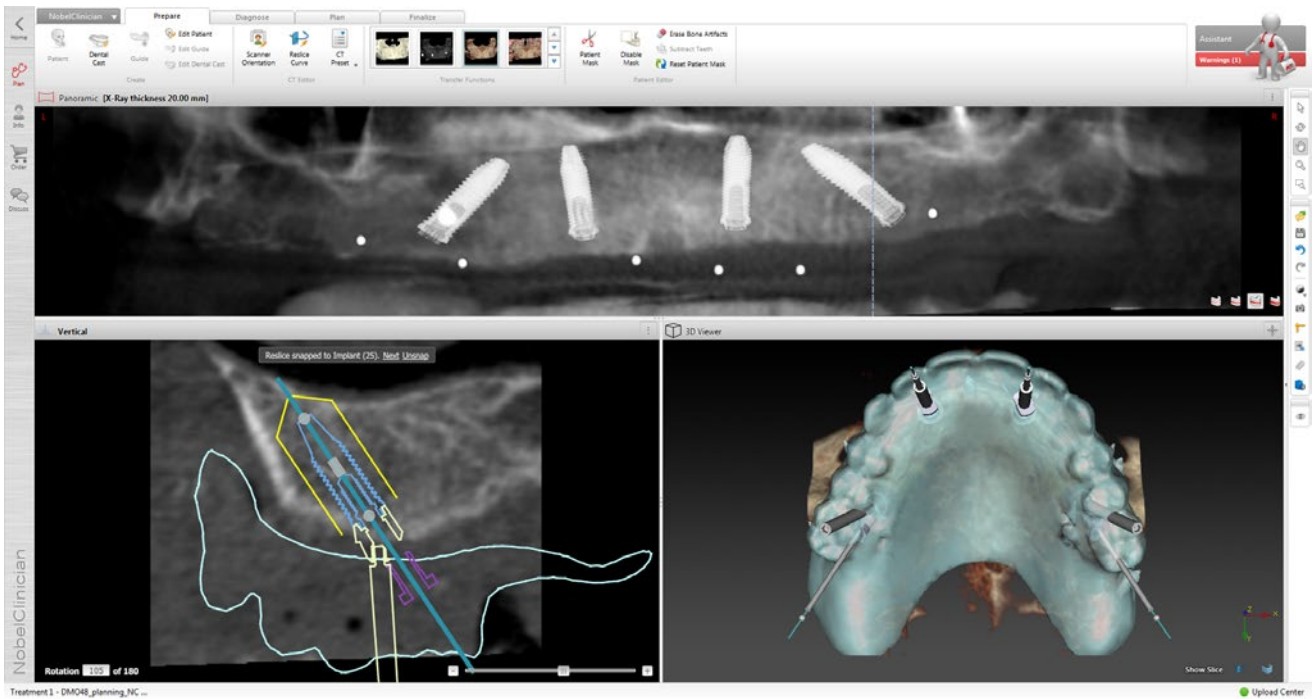
How digital treatment planning helps ensure predictable implant placement

When restoring a full arch using four implants, precise placement is essential. This is where DTX Studio™ Implant software can help.

DTX Studio™ Implant with radiographic guide supports prosthetic-driven treatment planning taking into account both the patient anatomy and restorative information.

3D models based on the radiological data set of the patient combined with the radiographic guide allow you to assess the quality and quantity of the available bone. Vital anatomical structures such as the alveolar nerve and the maxillary sinus can also be marked so that prosthetic-driven planning can be conducted.

You can control and customize the angulation of the dental reslice planes, ensuring that the tilted posterior implants, which are fundamental to the All-on-4® treatment concept, are optimally positioned.



Treatment planning using a radiographic guide in the DTX Studio™ Implant Software.

After completing your virtual planning in DTX Studio™ Implant, you can choose between freehand or guided surgery. If you select guided surgery, you are able to generate and order/fabricate a patient-specific surgical template based on your plan. The surgical template can either be for pilot drilling or fully guided.



Guided pilot drill surgical template for the All-on-4® treatment concept

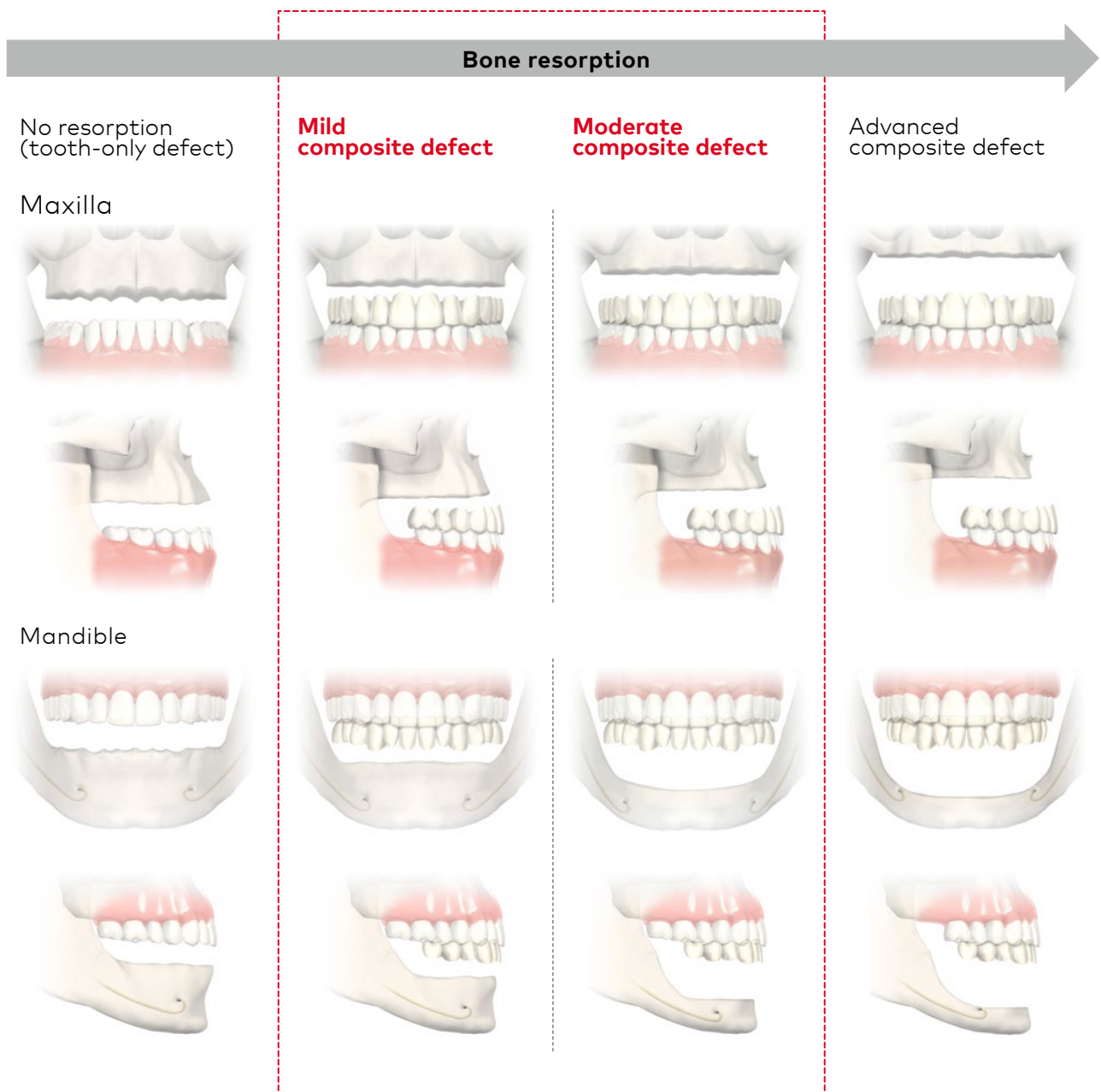


Fully guided surgical template for the All-on-4® NobelGuide treatment concept

The importance of bone resorption patterns

It is important to understand the degree of hard and soft tissue loss, as remaining alveolar bone directs the surgical protocol. This, in turn, supports the restorative treatment plan.

For patients with mild to moderate bone resorption the All-on-4® treatment concept could be considered as a possible treatment option.



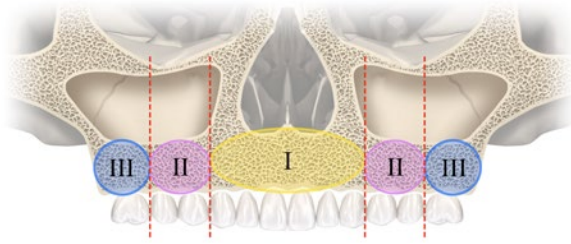
The following publication has been used to demonstrate composite defects:

- Bedrossian E et al. Fixed-prosthetic Implant Restoration of the Edentulous Maxilla: A Systematic Pretreatment Evaluation Method. J Oral Maxillofac Surg 2008;66:112-22

Treatment of the maxilla

Treatment in the maxilla requires evaluation of the available alveolar bone. Patients with bone only in zone I and zone II (below) could be candidates for the All-on-4® treatment concept.

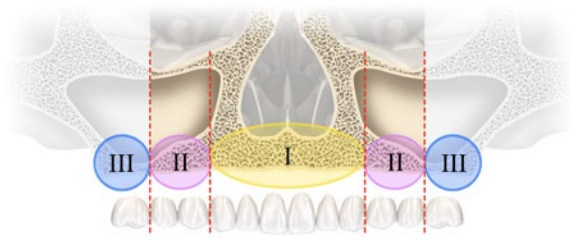
Group 1



Presence of bone in zones I, II and III



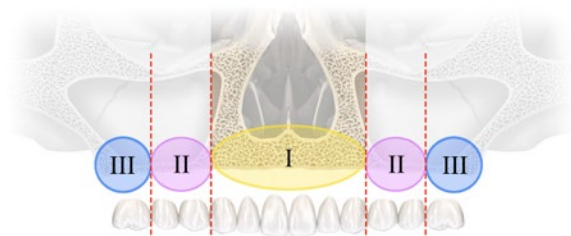
Group 2



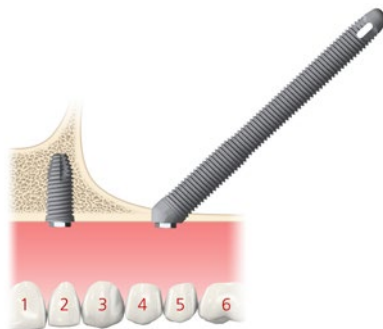
Presence of bone in zones I and II



Group 3



Presence of bone in zone I only



Bone resorption

The following publications have been used as support to pre-evaluate important factors as part of the decision making process for the edentulous treatment:

- (illustrations on the left side of the page) Bedrossian E et al. Fixed-prosthetic Implant Restoration of the Edentulous Maxilla: A Systematic Pretreatment Evaluation Method. *J Oral Maxillofac Surg* 2008;66:112-22
- (illustrations on the right side of the page) Maló P et al. The rehabilitation of completely edentulous maxillae with different degrees of resorption with four or more immediately loaded implants: a 5-year retrospective study and a new classification. *Eur J Oral Implantol* 2011;4(3):227-43

Treatment of the mandible

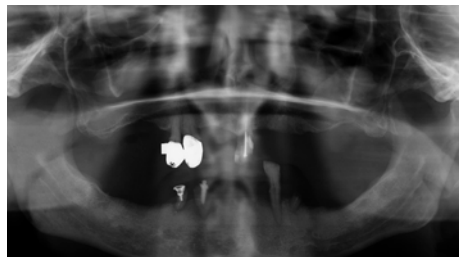
Although it is possible to have a tooth-only defect in the edentulous mandible, most patients present some degree of bone resorption. The surgical treatment options for this group of patients include axially placed or tilted implants to support a fixed implant bridge or a fixed-removable implant bar overdenture.

The All-on-4® treatment concept in action

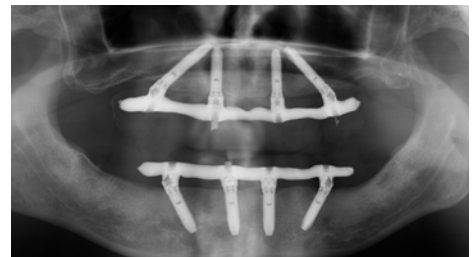
Get detailed information about these clinical cases in the final chapter.

Clinical case 1

Before the All-on-4® treatment



After the All-on-4® treatment



Clinical case 2

Before the All-on-4® treatment



After the All-on-4® treatment



Treatment planning considerations

The All-on-4® treatment concept was developed to maximize the use of available bone and to allow for Immediate Function. When planning a treatment using a flap technique, you can consider the following:

- ✓ Ability to achieve primary implant stability sufficient for immediate loading.
 - Implants should withstand a minimum tightening torque of 35 Ncm.
 - If this tightening torque is not achieved, a conventional healing phase is recommended prior to delivery of the provisional or final restoration.
- ✓ Available bone volume: indicated for edentulous maxilla with a minimum bone width of 5 mm and a minimum bone height of 10 mm from canine to canine.
- ✓ Available bone volume: indicated for edentulous mandible with a minimum bone width of 5 mm and a minimum bone height of 8 mm in between the mental foramina.
- ✓ If there are extraction sites, clean them thoroughly. It is advisable to place implants between extraction sockets.⁵
- ✓ To reduce the cantilevers, tilt the posterior implants to a maximum of 45°.
- ✓ For tilted posterior implants, plan the distal screw access holes to be located at the occlusal plane of the first molar, second premolar, or first premolar.

For more information please consult the All-on-4® treatment concept manual.

4 common challenges and how to avoid them

The All-on-4® treatment concept is a proven long-term solution for treating edentulous and soon to be edentulous patients. Successfully applied, it brings patients improved quality of life. Treatment results can suffer if shortcuts are made or key principles are not considered. Here are four things you need to take into account.

1 **Prosthetic challenge: accurate diagnosis and restorative considerations**

According to leading clinician Dr. Saj Jivraj, diagnosis is key. Starting with the prosthetic outcome in mind is crucial for good results with the All-on-4® treatment concept. What is the desired incisal edge position? Where is the smile line? What support does the upper lip require? All this needs to be addressed in advance to determine what kind of restoration will work best.

2 **Surgical challenge: adequate interarch space (vertical dimension) and bone reduction after extraction**

For an esthetic result it is crucial to ensure that there is enough space to seat the prosthesis. With the All-on-4® treatment concept, prosthetic requirements are surgical responsibilities. Proper diagnosis dictates whether the bone needs to be reduced during the surgery to move the transitional line below the lip line and the restoration should be adjusted accordingly.

3 Lab challenge: providing an optimal final restoration and denture conversion

Working with the right dental lab can be the key to achieving great treatment results with the All-on-4® treatment concept. And not just in terms of the final esthetics but in key aspects like hygiene too. For example, ensuring a convex, rather than a concave, intaglio surface for the denture can be what makes it possible for the patient to keep things clean and healthy long after surgery. Add too much space for cleaning, however, and the patient could end up inadvertently spitting or whistling through the gap between the mucosa and the prosthesis.

4 Compatibility of components

You should also think about the components you are using for the treatment. Are they designed to work together? Were they tested together? It's important to think of the implants, abutments and restoration as one complete system.

The All-on-4® treatment concept is about much more than placing and restoring four implants. It's a clinically proven concept that can restore a full jaw in a minimally invasive way – without bone grafting and taking the forces in the mouth into account.

The All-on-4® treatment concept is proven to be the best in its class of solutions for full-arch treatment using tilted implants. But only when Nobel Biocare products are combined.

Expert clinical cases and what you can learn from them



Dr. Steven Bongard, Canada

Restorative considerations

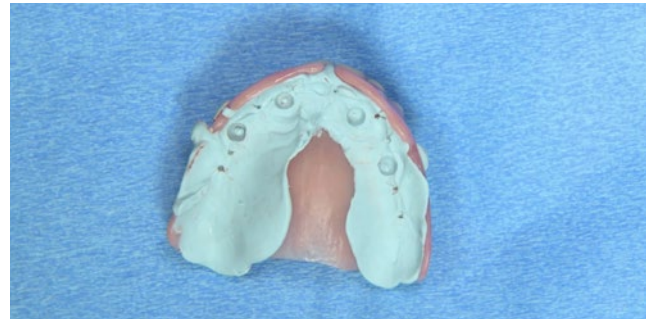
"Spending time on the correct diagnosis and treatment planning is key to a successful outcome. The clinician must determine if the patient is a candidate for either a fixed or a removable restoration by evaluating several critical clinical factors, such as: incisal edge position, restorative space, smile line, lip support and the emergence profile of the proposed restoration."

Denture conversion

"The fabrication of the immediate load prosthesis can be done directly or indirectly. The objectives remain the same: providing the patient with an esthetic and functional restoration on the day of surgery that satisfies biomechanical requirements. It has to be robust enough so that it does not break during the healing phase."

Clinical case: treatment of edentulous maxilla with denture conversion

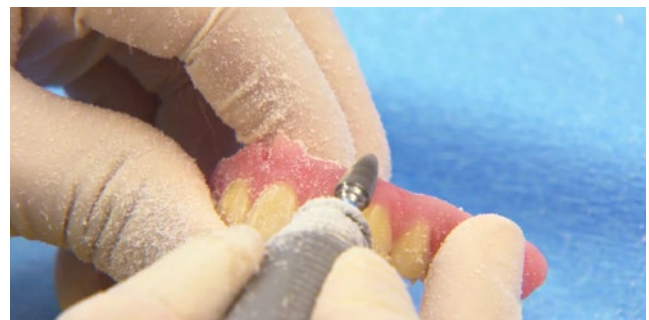
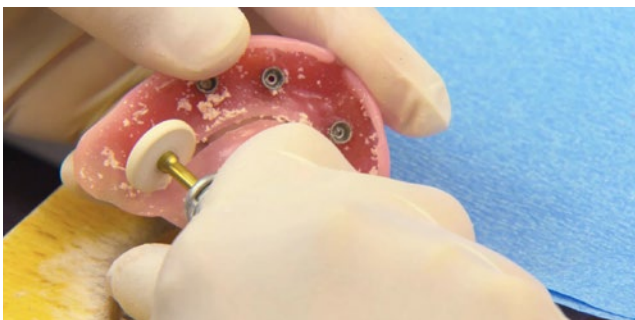
Clinical situation: Male patient in his seventies is edentulous in the maxilla.



Silicone impression is used with the existing denture to identify position of implant access holes.



Acrylic fixation of temporary copings to the denture.



Lab procedure: Modification of the denture and reducing the height of the temporary copings.



Intraoral view of polished temporary prosthesis.



Dr. Enrico Agliardi, Italy

Use of angled implants
in the anterior

"In patients with moderate resorption, the use of tilted implants allows the clinician to engage more bone. This angulation can be corrected with the use of a pre-angled abutment."

Clinical case: Bimaxillary full-arch rehabilitation on four implants

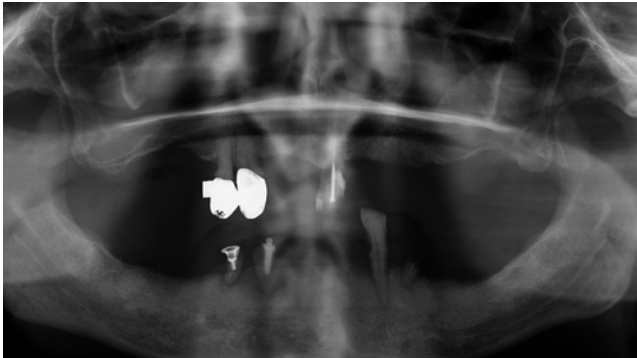
Clinical situation: This 64-year-old male complained about the poor masticatory performance of his partial removable dentures in the upper and lower jaws.



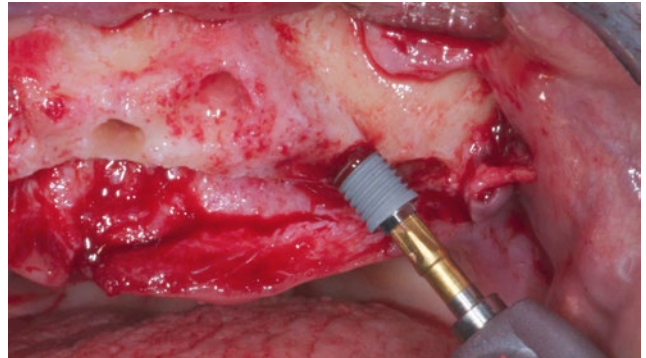
Initial situation with prosthesis, an esthetic improvement is needed.



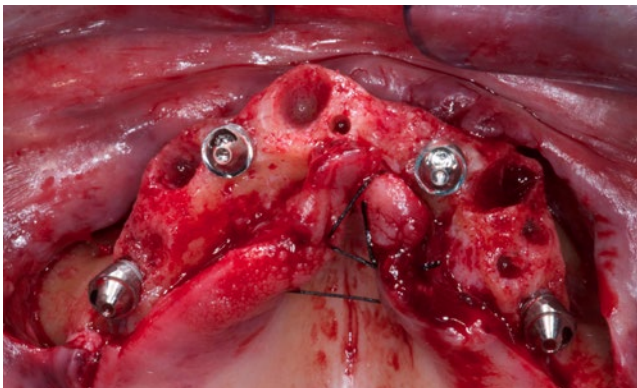
The residual dentition.



Initial panoramic radiograph.



Teeth were extracted and tilted implants were placed in the posterior zone.



Occlusal view of four placed implants and Multi-unit Abutments.



Occlusal view six months after the surgery.



Frontal view of bars.



Final prostheses.



Improved esthetics and smile of the patient.



Panoramic radiograph at three year follow-up.



Dr. Simonas Bankauskas, Lithuania

Selection of longer implants

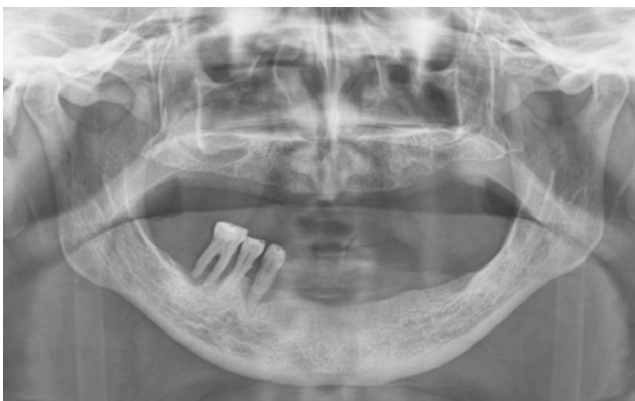
"Bicortical fixation is important for the success of an immediate loading procedure. Identifying where the implants will be surgically anchored and obtaining the required primary stability is critical. Longer implants may be required for this"

Bone reduction after extraction

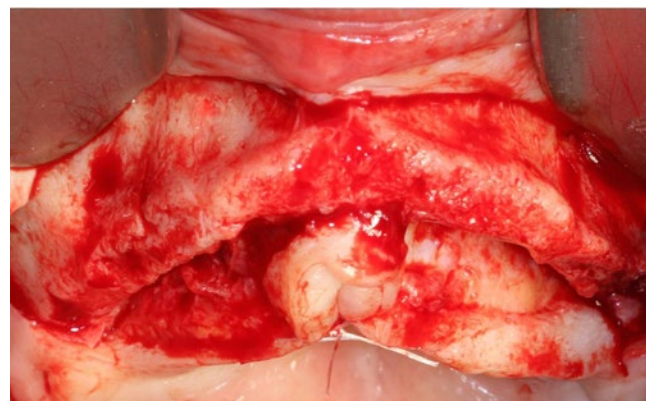
"Bone reduction is a restorative requirement and a surgical responsibility. Team communication is imperative for creating adequate restorative space, which ensures biomechanical strength for restorative materials"

Clinical case: treatment of edentulous maxilla using long implants

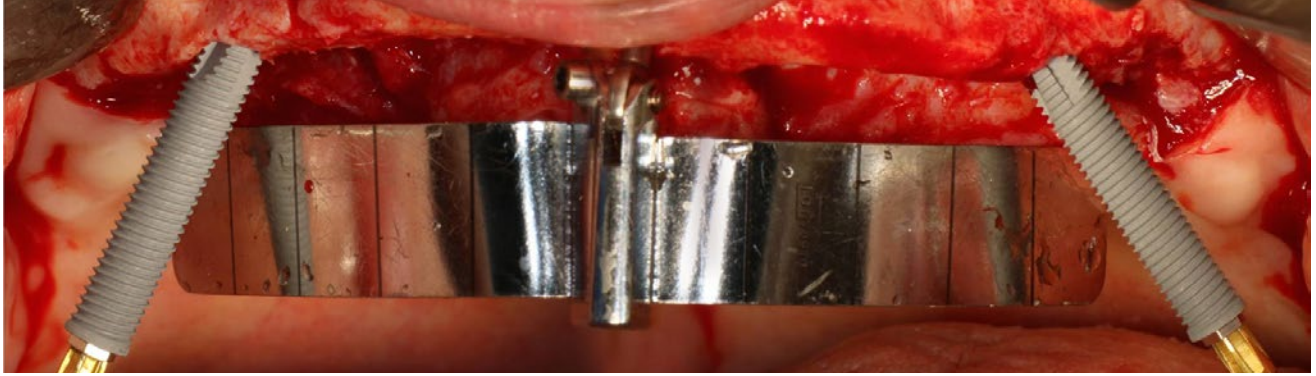
Clinical situation: 69-year-old female patient is edentulous in the maxilla and is partially edentulous in the lower jaw



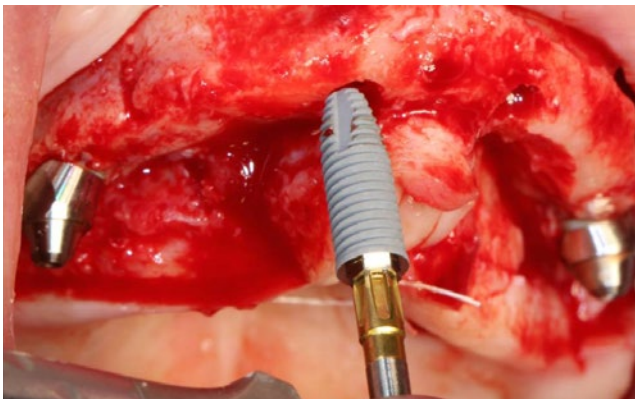
Initial panoramic radiograph.



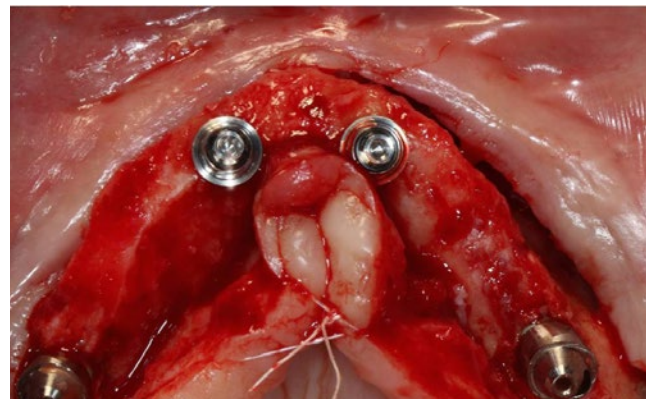
Flap is raised and the ridge is exposed and prepared for implant placement.



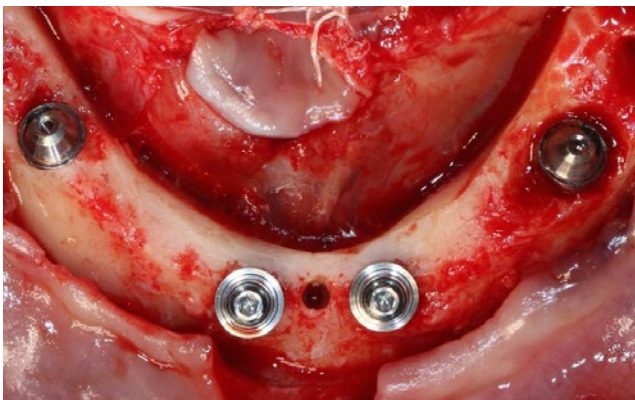
Using the All-on-4® guide, two NobelSpeedy Groovy implants 4.0 x 22 mm are placed at a 30-degree angle in the posterior.



Straight placement of two NobelSpeedy Groovy RP 4.0 x 11.5 mm implants in the anterior.



Straight Multi-unit Abutments are placed in the anterior and 30° angled Multi-unit Abutments in the posterior.



Following placement of both straight and angled implants, Multi-unit Abutments are placed.



Temporary prosthetic is adjusted into place for Immediate Function of implants.



Patient smile just after temporary prosthesis delivery.



Post operative OPG



Dr. Steven Parel, United States

Checklist for creating functional and esthetic temporary prosthetics

- 1 Determine and correct the incisal edge position.
- 2 Correct the occlusal plane.
- 3 Ensure that the trajectories of the implants and Multi-unit Abutments are in a favorable position.
- 4 Transfer information from the mouth to the lab (directly or indirectly).
- 5 Ensure adequate laboratory procedures, which include: adequate bulk of material, no cantilevers and a well-polished undersurface that is convex.
- 6 Manage occlusion so that the implants are protected.

Correction of occlusion

"Occlusion is most difficult to correct when addressing a single arch. Modifications of the opposing occlusion must be discussed with the patient. These modifications may include orthodontics, extraction, crowns or selective reshaping so that an appropriate occlusal scheme can be created."

Clinical case: Treatment of failing dentition in both arches

Clinical situation: This 68-year-old man had recently lost a left-side maxillary anterior fixed-partial denture due to extensive caries, and had several other teeth with large carious lesions.



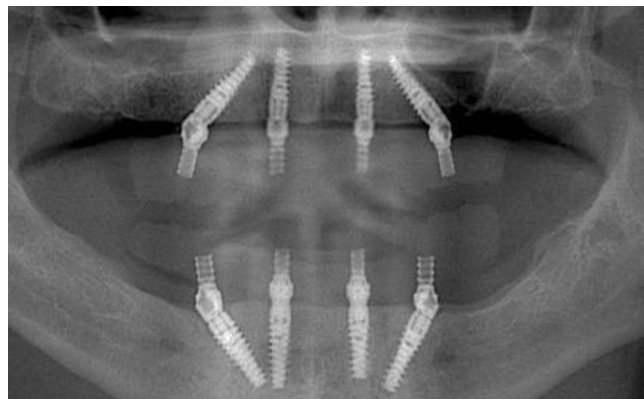
Unretracted pretreatment view shows no visible soft tissue in either arch. Visibility of tissue in the residual ridge is an important aspect of treatment planning, influencing both restorative and surgical approaches.



The presenting occlusion was a deep Class II Division 2 with posterior collapse and over closure.



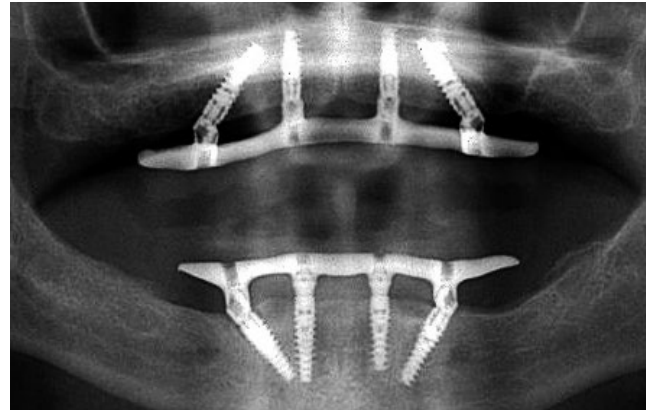
The hemi-edentulous arch presented an esthetic and restorative treatment planning challenge if implants are considered unilaterally.



The patient requested and consented to removal of remaining teeth with full-arch implant restorations in both jaws. The All-on-4® concept with NobelActive implants was used.



Sufficient primary stability was achieved for all implants, Immediate Function was possible in both arches. Cantilever stresses were minimized by reducing the cantilever length of the lower arch.



After provisionalization, the final restoration was constructed with a titanium precision-milled NobelProcera Implant Bridge. The wrap-around design allows for future modification due to soft tissue changes.



Intraoral view shows the final restorations. Acrylic teeth and soft tissue veneering were used to achieve the restorative outcome.



Unretracted smile photograph shows improved esthetics. The patient was able to successfully fulfill his desire to avoid a partial removable prosthesis which has been in function for several years.

Next step – All-on-4® treatment concept online course



Dr. Saj Jivraj, an experienced prosthodontist, together with Dr. Hooman Zarrinkelk, a board-certified oral and maxillofacial surgeon, will cover all the All-on-4® treatment concept essentials you need to know.

You will learn

- ✓ Seven diagnostic factors
- ✓ Considerations before treatment
- ✓ Critical surgical and restorative factors
- ✓ Surgical and prosthetic workflows
- ✓ How to successfully implement the concept in your practice
- ✓ And much more

Learn more at

info.nobelbiocare.com/en/all-on-4-online-course

References

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- 2 Babbush CA. Post-treatment quantification of patient experiences with full-arch implant treatment using a modification of the OHIP-14 questionnaire. *J Oral Implantol* 2012;38(3):251-260
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