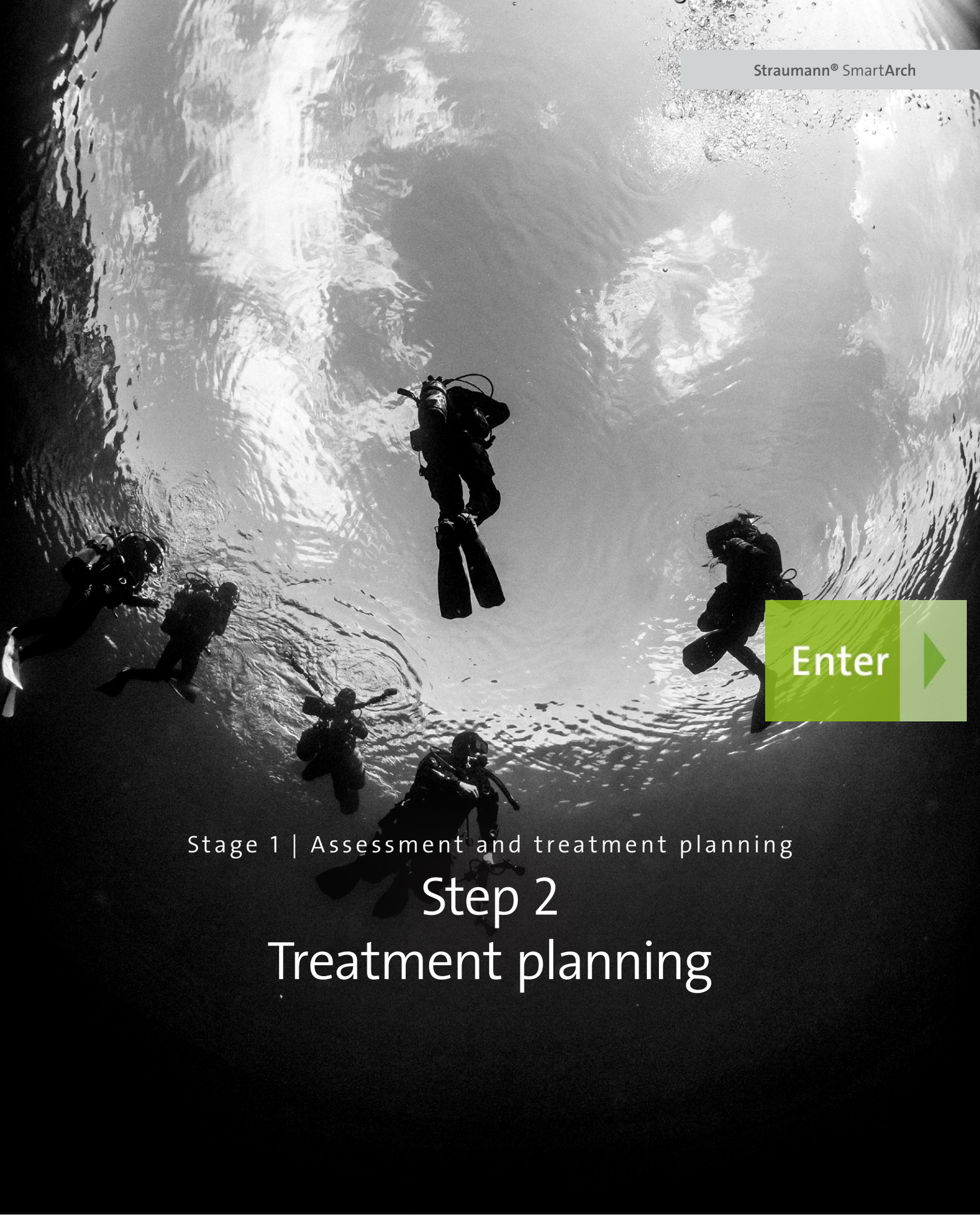
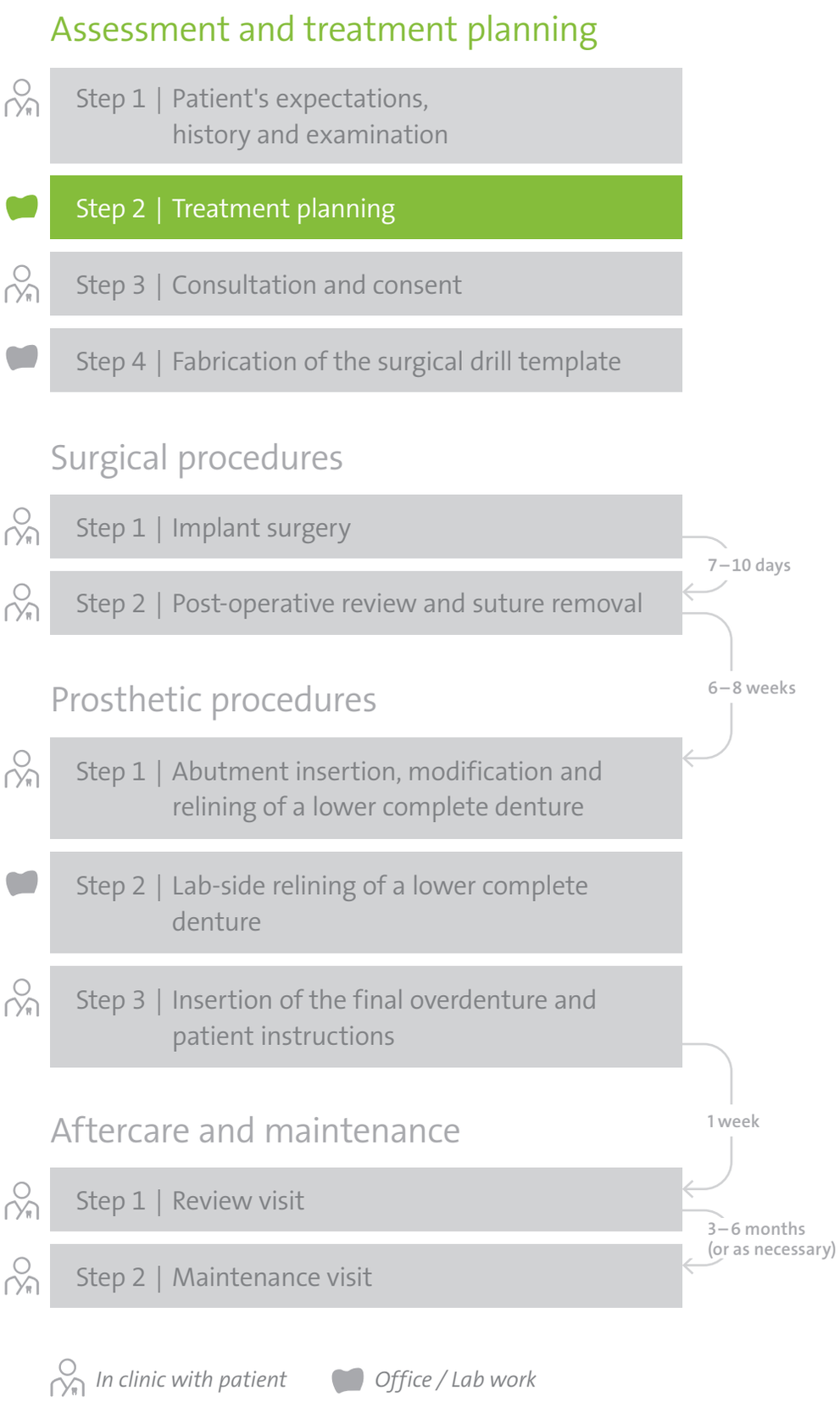


Enter

Stage 1 | Assessment and treatment planning

Step 2
Treatment planning

straumann
simply doing more


Assessment and treatment planning
Step 1 | Patient's expectations, history and examination
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Surgical procedures
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Contents

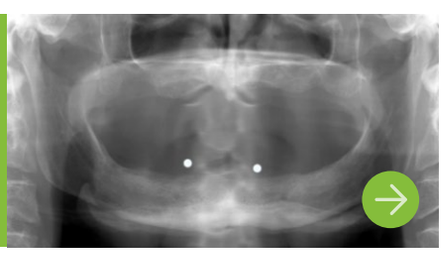
Introduction

A thorough patient assessment is the basis of any dental treatment plan. You can finalize the diagnosis and prognosis of the oral situation, and undertake treatment planning in your office with the information gathered from the initial visit with the patient.

1. Contacting the patient's physician

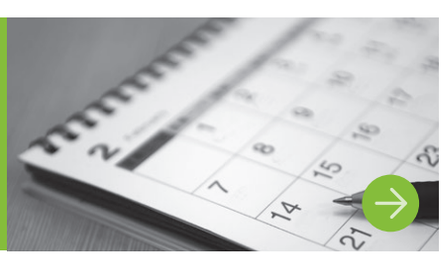
2. Analysis of the existing lower complete denture and finding the ideal implant position

3. Radiographic planning



4. Risk assessment

5. Visit planning and cost proposal



Systematically carry out treatment planning by following points 1 – 5.

Click on the graphic to go directly to the chapter.

Learning objectives

Be able to use the information gathered from the patient's history and examination to:

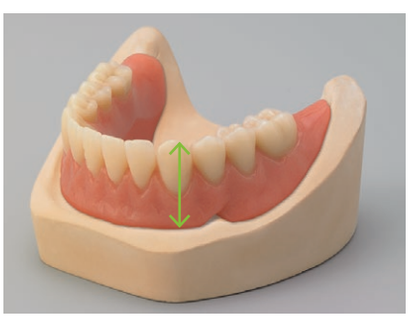
- Identify and select a patient who is suitable for straightforward implant treatment.
- Complete the risk assessment considering the patient's medical and dental history.
- Perform a thorough analysis of the radiographs to determine which implant to use.
- Use the Straumann® X-ray Template and the formula to calculate the distortion of the radiographic image for accurate planning.
- Be able to discuss with your dental technician the proposed case and any necessary restorative planning options.
- Be able to discuss the potential improvements that can be expected from implant placement.
- Prepare the treatment plan, costs and alternative treatment options for discussion with the patient at the next visit.

1. Contacting the patient's physician

The knowledge of former and current diseases, surgeries, and medications helps to identify patients who are at risk for complications of dental implant treatment. If there are any doubts, consult the physician or medical specialist treating the patient for further clarification[1].

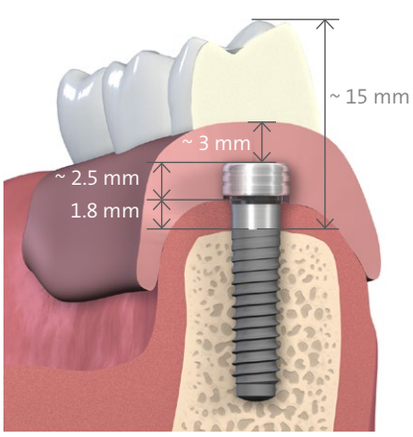
Confirm the medical status with the patient's physician if necessary.

2. Analysis of the existing lower complete denture and finding the ideal implant position



Measure the distance from the incisal edge to the vestibule.

Carefully analyze and measure the existing lower complete denture.

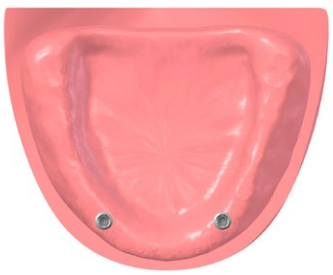


As a reference the height between the alveolar crest and the incisal edge should be approximately 15 mm.

Consider the implant type and diameter, prosthetic platform and position individually.

Assessment of the existing denture can provide valuable information, such as tooth wear, hygiene, retention, and position of dental arch.

Valuable information can be obtained from assessment of the existing denture.



The goal is to place the implants in the canine region.
The mechanical support is best if the implants are placed at the curvature of the dental arch.

Aim to place the implants in the canine region at the curvature of the dental arch.

⚠ **Caution:** The distance of the implants should be as wide as possible (not close as illustrated in this image) without allowing an anterior lever.

2.1 Correct implant position in the edentulous jaw

Whenever possible, the position of the implants should be prosthetically driven. The goal in the edentulous case should be to place each implant underneath a prosthetic tooth (e.g. the canine).

2.1.1 Bucco-lingual position

The buccal and lingual bone wall must be **at least 1 mm** thick to ensure stable hard and soft tissue conditions.

Minimum thickness of buccal and lingual bone wall: 1 mm.

For example, if you have a ridge width of 6.5 mm, then you are able to use a Ø 4.1 mm BLT (RC) Implant.

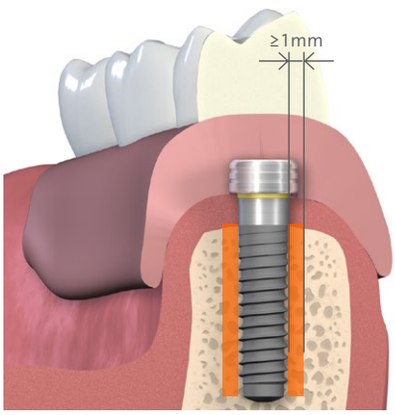
For NCC Implants, please refer to this chart of minimum bone widths.

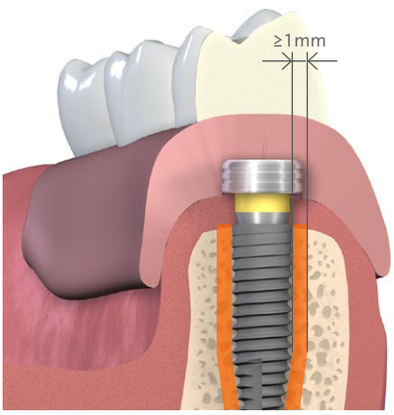
Chart for reference.

For BLT Implants, please refer to this chart of minimum bone widths.

Chart for reference.

⚠ **Caution:** As patients are often edentulous for several years, bone width is often compromised and therefore small diameter implants have to be considered to avoid GBR (Guided Bone Regeneration) procedures.





Caution: If the available orofacial bone is thinner than 1 mm, or a layer of bone is missing on one or more sides around the planned implant site, a bone augmentation procedure is indicated. This technique should be employed only by dentists who have adequate experience in the use of augmentation procedures. If it only becomes apparent during surgery that this minimum distance is not present , it is recommended to close the flap and refer the patient to a specialist or colleague with adequate experience in GBR (Guided Bone Regeneration) procedures.

Refer cases which require GBR to more experienced colleagues.

2.2 Vertical position

NNC Implants:

- The rough surface of the implant body should be entirely covered by the bone. Due to resorption, the lingual and buccal portions of the bone may not be at the same level.
- The polished collar (height of 1.8 mm) is positioned transmucosally.

Be aware that the lingual and buccal portions of the bone may not be at the same level.

BLT Implants:

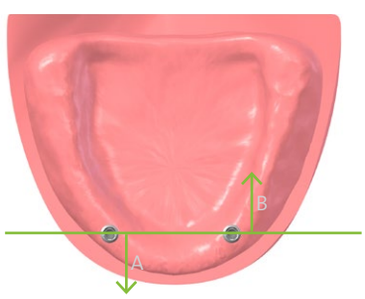
- The rough surface of the implant body should be entirely covered by the bone.

2.3 Anteroposterior position

The axis passing through the implants creates a fulcrum line.

The more posterior the abutments are located, the greater the tendency for the mandibular denture to rock around this axis when biting with the front teeth.
Consider these two priorities when planning the positions of the two mandibular implants in the canine region.

Aim for an anterior position with the implants as far away from each other as possible.



First priority:

- Do not create an anterior lever

Second priority:

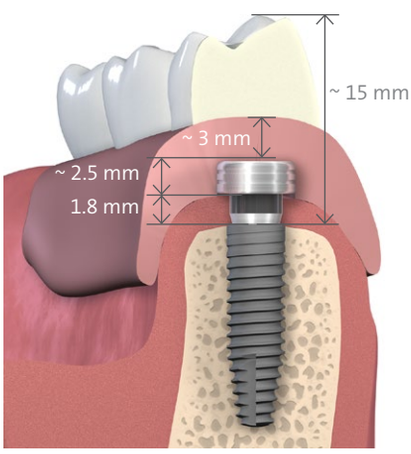
- Implants should be placed as far away from each other as possible

2.4 Inter-occlusal space

The space needed for the retentive components is a crucial factor for implants in the edentulous ridge.

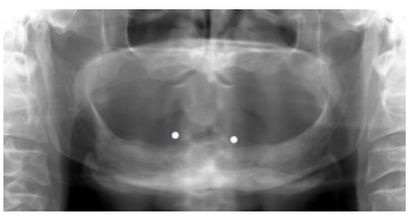
- The upper border of the abutment should be 1.0 mm above the mucosa.
- The corresponding height of the housing is approx. 2.5 mm.
- Therefore, a space of approximately 15 mm (from the alveolar crest to the incisal edge) is required to provide the patient's denture with implant-supported LOCATOR® Abutments/ Novaloc® Abutments.

Approximately 15 mm is required from the alveolar crest to the incisal edge.



Caution: The lingual denture flange can become bulky from housing the attachments. This is mostly tolerated by patients, but should be kept in mind.

3. Radiographic planning



The vertical bone availability determines the maximum allowable length of the implant that can be placed, and can be assessed on a radiographic image.

3.1 Outline important landmarks

Outline important landmarks on the panoramic radiograph using a transparent paper and a pencil.

Outline the important landmarks on the radiographs, especially the mental foramen position.

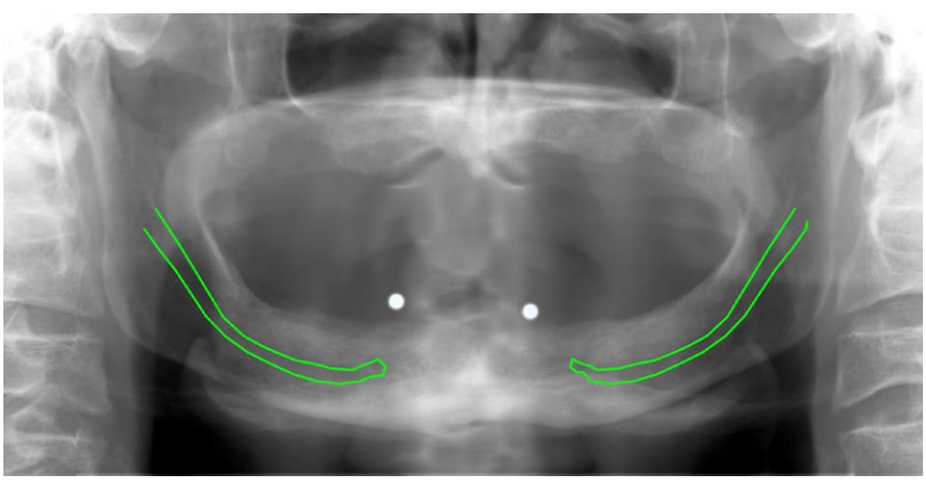
Video: Treatment planning with the Straumann® X-ray Template.

Caution: It is important to identify the position of the mental foramen. This can be achieved by using a panoramic radiograph and clinical palpation.
Note that all anatomical variations are patient-specific.

The anatomy of the inferior alveolar nerve (IAN)[2]:

- The main trunk of the IAN enters lingual to the ascending ramus
- Often there is a bony protection called the lingula
- The IAN travels through the body of the mandible
- The IAN loops superiorly, exiting the mental foramen in posterior direction, with some minor branches for the interforaminal region
- It then branches into the mental and incisive nerves.

⚠ **Caution:** To place an implant within the "safety zone", the distal aspect of the implant needs to be **at least 2 mm** anterior to the most anterior aspect of the inferior alveolar loop.



The outline of the inferior alveolar canal as it passes the foramen mentale, easily measured by panoramic radiograph.

3.2 Evaluate and assess:

3.2.1 Adjacent anatomical structures

Landmarks in the mandible: crest of the ridge, inferior alveolar nerve, mental foramen and submandibular fossa/concavity.

A safety distance of **2 mm** of bone between apex of the implant and neurovascular structures should be respected.

⚠ **Caution:** The loss of bone height due to ridge flattening during surgery must always be considered.

Maintain a safety distance of 2 mm from the implant to the mandibular canal or mental foramen.

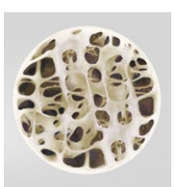
3.2.2 Bone height

Assess the distance between the crest and the lower cortical margin of the mandible.

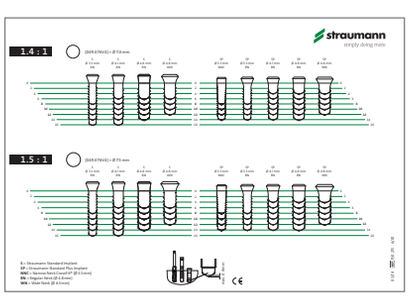
3.2.3 Bone quality

Less dense or Type-IV bone may indicate a preference to use the Bone Level Tapered Implant for better primary stability.

Bone which appears less dense in the radiograph indicates soft bone quality.

Type 1	Type 2	Type 3	Type 4
Very hard bone	Hard bone	Soft bone	Very soft bone
Homogenous cortical bone	Thick cortical bone with marrow cavity	Thin cortical bone with dense trabecular bone of good strength	Very thin cortical bone with low density trabecular bone of poor strength
			

3.3 Measure the available vertical bone height and select the appropriate implant type, diameter and length



This can be done with the help of the Straumann® X-ray Reference Spheres and X-ray Templates for Straumann® Standard Plus Implants and Straumann® Bone Level Tapered Implants.

Use the Straumann® X-ray Template corresponding to the type of implant chosen.

Distortions can occur in X-rays, hence the implant dimensions shown on these individual templates are designed with the corresponding distortion factors (1:1 to 1.7:1).

Determining each magnification factor or scale is facilitated by showing the X-ray Reference Sphere on the template (next to the scale reference).

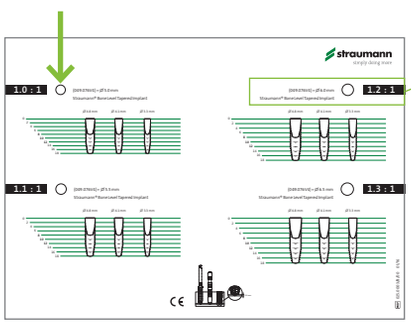
Video: Treatment planning with the Straumann® X-ray Template

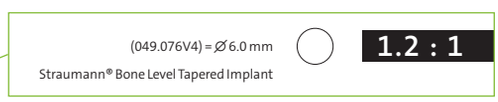
For an implant-supported overdenture, in most cases an implant length of 8, 10 or 12 mm should be suitable.

3.3.1 Compare the size of the X-ray Reference Sphere*

First, compare the size of the X-ray Reference Sphere* on the patient's X-ray with the size of the X-ray Reference Sphere on the template (marked with arrow). Superimpose the two pictures to find the correct scale. Then, determine the spatial relations around the implant.

*The X-ray Reference Sphere has a diameter of 5 mm. The image of the sphere on the X-ray provides the reference value for the magnification scale.





Example:
Scale 1.2 : 1 = Reference Sphere
Ø 6.0 mm

Use the Straumann® X-ray Template and compare with the Straumann® X-ray Reference Spheres in the radiograph to determine the correct magnification factor.

3.3.2 Bone availability (X-ray)

On the X-ray, measure the height of the available bone from the crest of the edentulous ridge to the anatomical landmarks that limit the placement of each implant. Make sure you do this measurement in line with the axis of each proposed implant.

Calculation of bone availability

To calculate the effective vertical bone availability, use the following formula:

$$\frac{\text{X-ray Reference Sphere 5 mm} \times \text{bone availability (X-ray*)}}{\text{Reference Sphere diameter on the X-ray}} = \text{Effective bone availability}$$

Use this formula to calculate the available vertical bone.

* Taking into consideration all implant-related anatomical structures (e.g. mandibular canal, etc.)

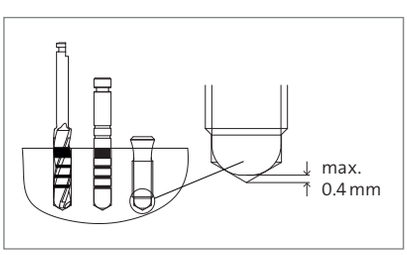
$$\frac{5\,\text{mm} \times 13\,\text{mm}}{6\,\text{mm}} = 10{,}8\,\text{mm}$$

For example, if the measured bone availability and Reference Sphere diameter on the X-ray are 13 mm and 6 mm (+ 20 % distortion), respectively:

The effective bone availability would be 10.8 mm, therefore you would choose an implant length of 10 mm.

⚠ **Caution:** The loss of bone height due to ridge flattening during surgery must always be considered.

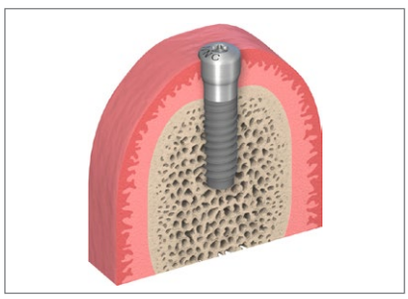
3.3.3 Consider the additional length of the drill tip



Due to the construction and function of the drills, the drill tip is a maximum of 0.4 mm longer than the implant insertion depth. This additional length must be taken into consideration during the planning phase.

The top of the drill is up to 0.4 mm longer than the implant insertion depth.

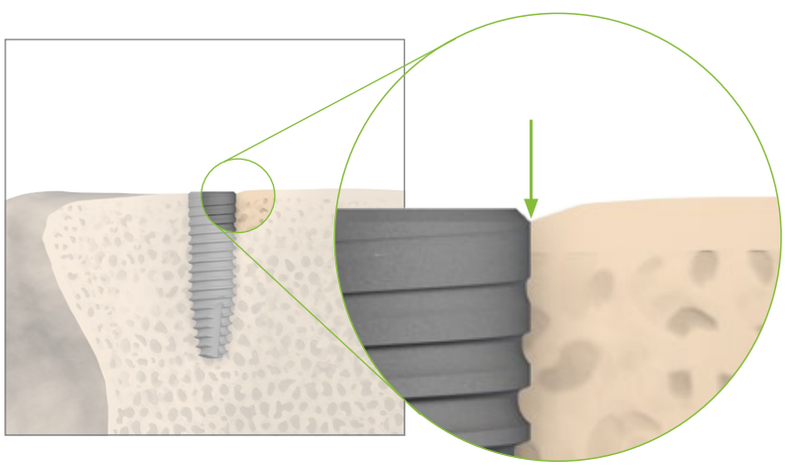
3.3.4 Consider the coronoapical (vertical) implant position



The Standard Plus Narrow Neck CrossFit® Implant with its smooth neck collar of 1.8 mm should be submerged in the bone as far as the margin of the rough implant surface. It can be placed slightly deeper, but the preparation depth must be increased accordingly.

Consider the implant's vertical position in the bone.

The Bone Level Tapered Implant is best placed with the outer rim of the small 45° sloping edge (chamfer) at bone level.

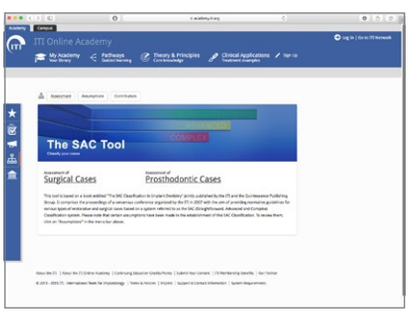


4. Risk assessment

After collecting all relevant information of the patient history and after performing a comprehensive clinical and radiographic examination, assess the complexity and risks associated with placing implants in your patient's edentulous mandible.

The SAC classification system developed by the ITI (International Team for Implantology) differentiates between straightforward, advanced and complex cases. The assessment for the surgical and restorative part of implant placement takes into consideration the patient, the site of implantation and the processes involved.

Use the SAC classification tool to determine if the case is straightforward.



You can perform this risk assessment with the help of the online SAC Tool which you can find at the ITI Online Academy.

This free and helpful tool allows you to decide whether to treat the case by yourself, or whether a referral is required.

Straumann® Smart users are advised to consider these prerequisites for a straightforward implant case in the edentulous mandible:

1. Last tooth extraction at least 4 months prior to treatment
2. Edentulous mandible with an existing lower complete denture with a desire for better retention and stability. However, there is no need for a replacement in terms of esthetics, occlusal wear, vertical occlusal dimension and denture hygiene
3. Sufficient alveolar ridge width and height for implant placement without the need for bone augmentation, and attached mucosa of at least 4 mm width in the canine region
4. Healthy patient (ASA-1: a normal healthy patient; or ASA-2, a patient with mild systemic disease)[3] with undisturbed wound healing capacity
5. Good patient motivation and compliance, preferably a non-smoker
6. Conventional loading protocol (≥ 3 months after implant placement)
7. Minimum vertical oral opening space of 30 mm to allow access with surgical instruments

Ensure that the prerequisites for a straightforward implant case are fulfilled.

Caution: Any pathological condition such as caries, periapical infections or periodontitis in the antagonistic jaw, temporomandibular joint disorders or oral mucosal lesions should be treated prior to implant placement.

Be aware of conditions requiring treatment prior to implant placement.

In cases of residual probing depths (PD) ≥ 5 mm with concomitant bleeding on probing in the antagonistic jaw, full-mouth plaque scores > 20%, and associated risk factors, pre-treatment and periodontal re-evaluation are mandatory before implant placement.

5. Visit planning and cost proposal

The goal of the treatment is to satisfy the patient's demands regarding chewing comfort and esthetics, with a favorable long-term prognosis of the restoration. To reach this goal, you will need to:

5.1 Establish a diagnosis and prognosis of placing implants in the mandible to support an overdenture and also the remaining dentition in the antagonistic jaw.

Prepare a diagnosis and treatment plan for the discussion with your patient.

5.2 Elaborate a treatment plan and calculate the amount of chairside time per visit and total number of visits required by the patient.

Include chairside time and total number of patient visits in the treatment plan.

- All diseases in the oral cavity (hard and soft tissue) have to be treated before implant placement starts.
- In case of insufficient oral hygiene or active periodontal disease in the antagonistic jaw, additional dental treatment may be needed before starting with the implant procedure, and should be factored into the cost proposal. Consider this when:
  - the patient presents with poor oral hygiene
  - there is active periodontal disease in the antagonistic jaw
  - there are stomatological lesions.

In the case of an edentulous ridge, there are several treatment options:

1. Fabrication of a new complete denture if the existing denture is insufficient:
   – The new denture is created on a master cast in the usual way

2. Modification of an existing lower complete denture into an overdenture supported by LOCATOR® Abutments or Novaloc® Abutments with simultaneous relining (lab-side procedure):
   – Requires a dental lab
   – Includes a relining of the denture
   – Needs special costs and planning: the dental technician subsequently fabricates and finishes the denture immediately after impression-taking and returns it, ideally on the same day.

3. Modification of an existing lower complete denture into an overdenture supported by LOCATOR® Abutments or Novaloc® Abutments in the patient's mouth (chair-side procedure).

Caution: If the denture is insufficient, a new denture has to be manufactured prior to planning any treatment with the Straumann® SmartArch solution!

Be aware of the various treatment options for an edentulous patient:
- fabrication of a new complete denture
- lab-side modification of an existing lower complete denture
- chair-side modification of an existing lower complete denture.

5.3 Calculate costs and write up a cost proposal

Analyze and calculate the approximate total costs for the surgical treatment in comparison to alternative treatment modalities.

A cost estimate is important for discussion with the patient.

Chart of minimum widths of bone for planning which SP NNC Implant to use

Implant type (endosteal diameter)	Shoulder diameter (mm)	Bucco-lingual or bucco-palatal width of bone (mm)	Recommended use for Straumann® Smart cases
SP ∅ 3.3 mm NNC 	3.5	5.5	For narrow edentulous bone ridges. **Caution/Precaution:** Small-diameter implants are not recommended for the posterior region.

Chart of minimum widths of bone for planning which BLT (NC/RC) Implant to use.

Implant type (endosteal diameter)	Shoulder diameter (mm)	Bucco-lingual or bucco-palatal width of bone (mm)	Recommended use for Straumann® Smart cases
BLT ∅ 3.3 mm NC 	3.3	5.5	For narrow interdental spaces and narrow partially or fully edentulous bone ridges. **Caution/Precaution:** Small-diameter implants are not recommended for the posterior region.
BLT ∅ 4.1 mm RC 	4.1	6	For use in the maxilla and mandible, for restoration of partially or fully edentulous patients.
BLT ∅ 4.8 mm RC 	4.8	7	For use in the maxilla and mandible, for restoration of partially or fully edentulous patients in wide interdental spaces and bony ridges.

Assessment and treatment planning

Step 2 | Treatment planning

REFERENCES

1 Buser D, von Arx T, ten Bruggenkate C, Weingart D. Basic surgical principles with ITI implants. Clin Oral Implants Res 2000; 11 (Suppl.): 59–68.

2 Rosenquist B. Is there an anterior loop of the inferior alveolar nerve? Int J Periodontics Restorative Dent 1996;16(1): 40-5.

3 American Society of Anesthesiologists® Physical Status Classification System, http://www.asahq.org/resources/clinical-information/asa-physical-status-classification-system

Assessment and treatment planning

Step 2 | Treatment planning

DISCLAIMER

Straumann® Smart is a blended training and education program focused on the education of general dentists who want to become surgically active in the field of dental implantology. The program is limited to information pertaining to straightforward implant cases and focuses on a reduced portfolio of products that are suitable for the treatment of such cases.

All clinical Straumann® Smart content – such as texts, medical record forms, pictures and videos – was created in collaboration with Prof. Dr. Christoph Hämmerle, Prof. Dr. Ronald Jung, Dr. Francine Brandenberg-Lustenberger and Dr. Alain Fontolliet from the University of Zürich, Clinic for Fixed and Removable Prosthodontics and Dental Material Science, Switzerland.

Straumann does not give any guarantee that Straumann® Smart provides sufficient knowledge or instruction for the dental professional to become surgically active in the field of implantology. It is the dental professional's sole responsibility to ensure that he/she has the appropriate knowledge and instruction before placing dental implants.

Straumann® Smart does not replace a careful and thorough analysis of each individual patient by a dental professional. Further, it does not imply any guarantee or warranty with regard to completeness of the information provided to the patient. It does not replace the dental professional's duty to inform the patient about the treatment, the products and the risks involved and to receive the patient's informed consent. The dental professional is solely responsible for determining whether or not a treatment or product is suitable for a particular patient and circumstances. Knowledge of dental implantology and instruction in the handling of the relevant products is always necessary and the sole responsibility of the dental professional. The dental professional must always comply with the individual product's Instructions For Use as well as all laws and regulations.

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