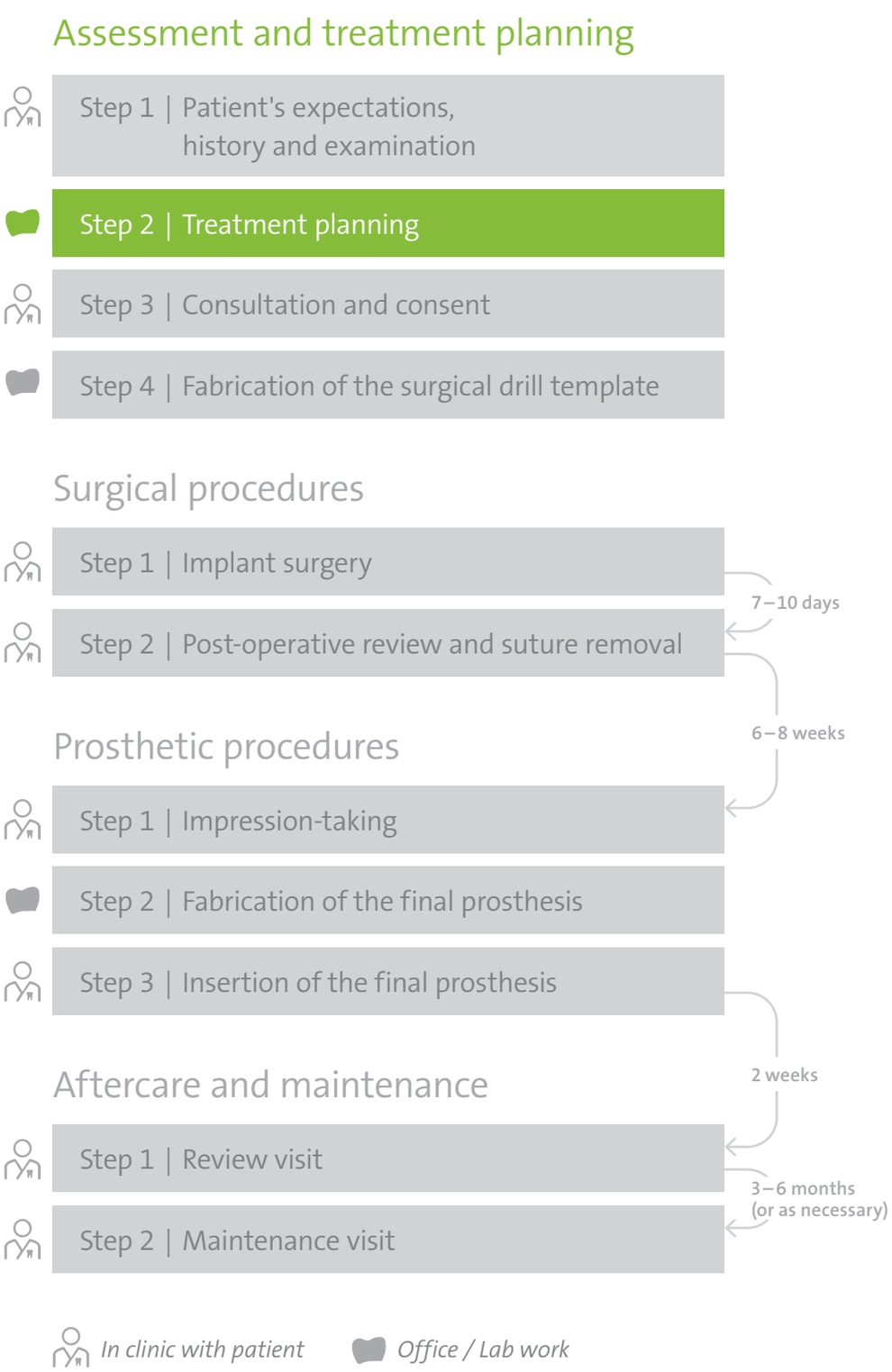
Stage 1 | Assessment and treatment planning

Step 2
Treatment planning

straumann
simply doing more


Assessment and treatment planning
Step 1 | Patient's expectations, history and examination
Step 2 | Treatment planning
Step 3 | Consultation and consent
Step 4 | Fabrication of the surgical drill template
Surgical procedures
Step 1 | Implant surgery
7–10 days
Step 2 | Post-operative review and suture removal
6–8 weeks
Prosthetic procedures
Step 1 | Impression-taking
Step 2 | Fabrication of the final prosthesis
Step 3 | Insertion of the final prosthesis
2 weeks
Aftercare and maintenance
Step 1 | Review visit
3–6 months (or as necessary)
Step 2 | Maintenance visit
In clinic with patient
Office / Lab work

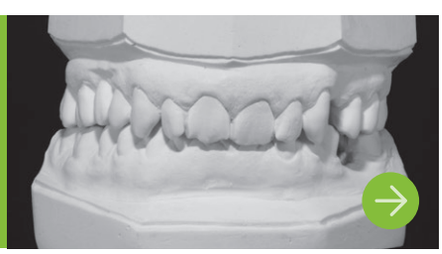
Contents

Introduction

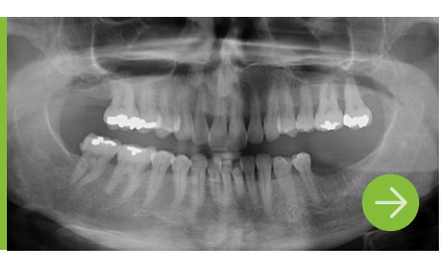
A thorough patient assessment is the basis of any dental treatment plan. You can finalize the diagnosis and prognosis of the oral situation, and undertake treatment planning in your office with the information gathered from the initial visit with the patient.

1. Contacting the patient's physician

2. Study model analysis

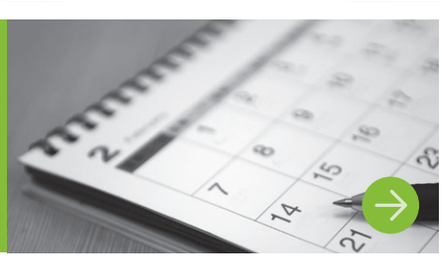


3. Radiographic planning



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 or dental history.
- Perform a thorough analysis of the study models and radiographs to finalize the diagnosis and prognosis of the dentition, determine which implant to use, and plan restorative options including any necessary adjunctive therapy before implant treatment.
- 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.
- 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. Study model analysis

A detailed and accurate space assessment is often difficult to do intraorally. It is recommended to obtain initial impressions to fabricate and mount study models, in order to properly perform diagnostic and planning steps.

The study models may be used for:

- Analysis of the occlusion
- Assessment of available space
- Assessment of other factors that might not be easily noted or recorded at the chair-side
- Creation of a diagnostic wax-up
- Creation of an X-ray template

Use study models to properly analyze and plan the treatment.

Video: Study model analysis

Select the implant diameter, implant type, and position individually. Discuss with your **dental technician** on how to design the restoration so that the necessary oral hygiene measures can be carried out.

Discuss with your dental technician about the design of the final restoration.

A few important considerations to note about planning implants and their abutments:

Important considerations when planning implants and final restorations

- The implant abutments should always be axially loaded.
- The future implant should be planned with a restoratively-driven implant position in mind.
- The long axis of the implant should be aligned with the cusps of the opposing tooth.

To establish the ideal topographical situation, axial orientation, and choice of implants, we recommend the following to be fabricated by the dental technician:

Ask your dental technician to create a diagnostic wax-up and surgical drill template.

- A diagnostic wax-up in the edentulous area
- A resin-based surgical drill template to help determine the correct implant position during implant surgery

2.1 Procedure

Apply the Straumann® Diagnostic T on the study model to obtain an initial measurement of the interproximal distance for the choice of the implant shoulder diameter and prosthetic reconstruction.

Use the Straumann® Diagnostic T to help choose the prosthetic platform of the future implant.

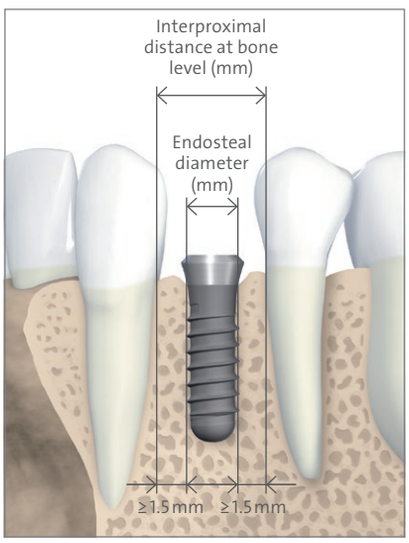
Analyze the implant position three-dimensionally on the study model.

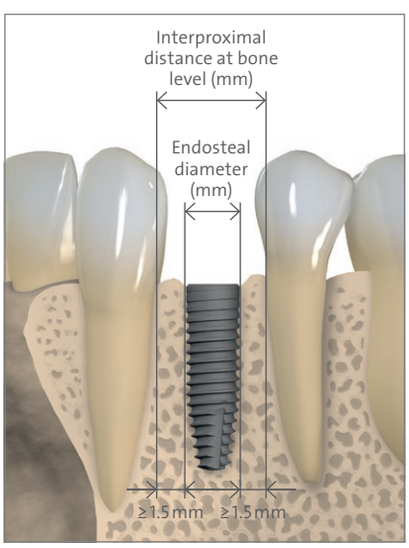
Assess the 3D space for the implant on the study model.

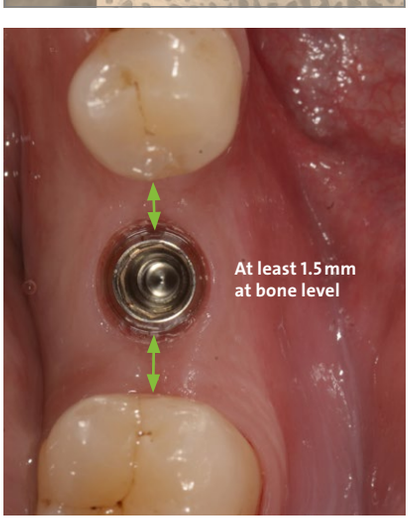
2.1.1 Interproximal distance of bone
2.1.2 Bucco-lingual (or bucco-palatal) width of bone
2.1.3 Inter-occlusal distance

2.1.1 Interproximal distance of bone

The interproximal bone availability is an important factor for choosing the implant type and diameter.







In a single tooth gap, a **minimal distance of 1.5 mm of bone** from the implant to the adjacent tooth **at bone level** (mesial and distal) is required. This will help to preserve bone and soft tissue to create a restoration with adequate emergence profile and soft tissue attachment to support oral hygiene measures and esthetics.

Minimal distance of bone from implant to adjacent tooth at bone level: 1.5 mm.

Reduced horizontal distance between tooth and implant can lead to bone resorption at adjacent teeth and reduced ability to clean around the restoration. If this minimum distance of 1.5 mm from the planned implant to the adjacent tooth at bone level is not possible, consider a smaller implant diameter or alternative treatment options (e.g., conventional prosthetics, orthodontics).

⚠ **Caution:** We do not recommend the use of a 3.3 mm endosteal diameter implant stand-alone in the posterior region due to the strength of masticatory forces in this area.

→ For SP 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

2.1.2 Bucco-lingual (or bucco-palatal) width of bone

The facial and palatal bone wall must be **at least 1 mm** thick in order to ensure stable hard and soft tissue conditions.

Minimum thickness of bucco-lingual or bucco-palatal bone wall in posterior areas: 1 mm.

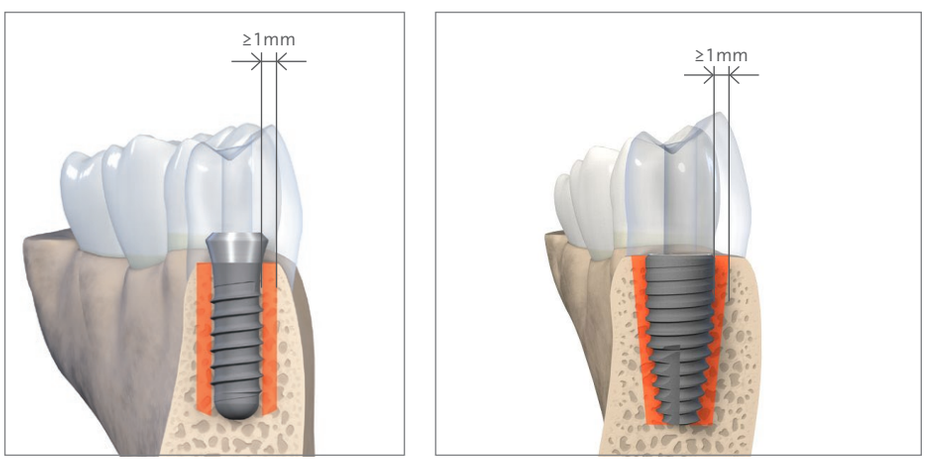
For example, if the planned implant site has a bucco-lingual bone width of 6.5 mm, then you are able to use a 4.1 mm endosteal diameter Standard Plus or Bone Level Tapered Implant.

For SP 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

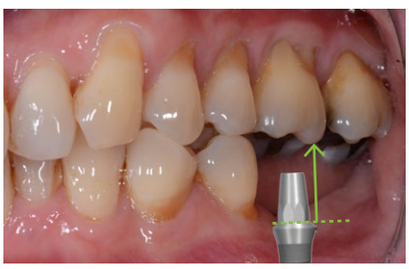


Caution: If the available orofacial bone is thinner than 1 mm or a layer of bone is missing on one or more sides around the planned implant site, a bone augmentation procedure is indicated. This technique should be employed only by dentists who have adequate experience in the use of augmentation procedures. 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.

2.1.3 Inter-occlusal distance

The inter-occlusal distance is the distance from the future implant shoulder to the opposing tooth. The minimum distance is about **7 mm** for cement-retained restorations and about **4 mm** for screw-retained restorations.



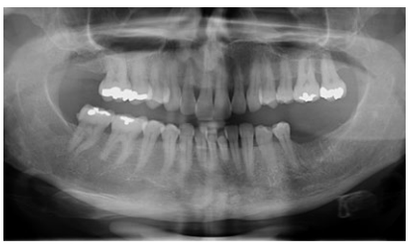
Space requirements depend on the design of the restoration, including the selection of abutments and crowns. We recommend that you discuss this with your dental technician during treatment planning in order to have a restoratively-driven orofacial implant position and axis. The presence of overeruption of the opposing dentition or the presence of cross-bites can reduce the space available for the final restoration.

Caution: If the available space is insufficient due to overeruption of the opposing teeth, depending on the extent of available space, minimal enameloplasty, orthodontic intervention, elective endodontics, crown lengthening, and crown in the opposing quadrant may be indicated. Such restorative cases should be handled only by clinicians who are experienced in treating advanced or complex cases.

Minimum inter-occlusal distance required:
≥ 7 mm for cement-retained restorations
≥ 4 mm for screw-retained restorations

For optimal results, discuss the final restoration with your dental technician.

3. Radiographic planning

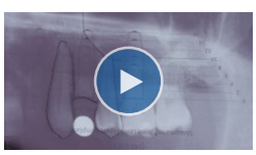


The vertical bone availability determines the maximum allowable length of the implant that can be placed and can be assessed on a radiographic image.

3.1 Outline important landmarks

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

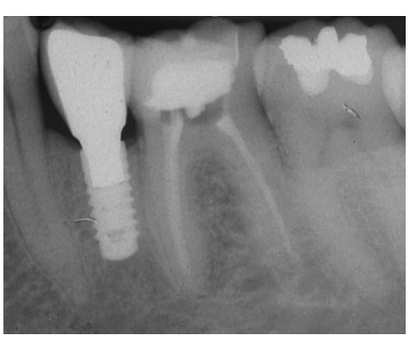
Outline important landmarks on the radiographs.



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

3.2 Evaluate and assess

3.2.1 Adjacent anatomical structures when determining available bone height

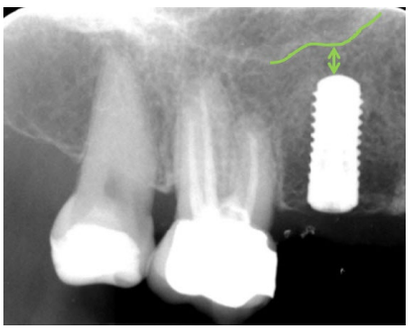


Note the proximity of this implant to the mesial root of the molar

Inclination and condition of adjacent roots

Convergent adjacent roots may compromise available interproximal space. Respect this root anatomy to avoid injury or interference during implant placement. Injury of adjacent teeth during implant placement can result in root canal treatment and/or damage to the root that leads to further tooth loss.

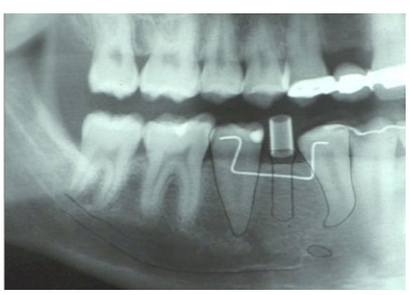
Consider the anatomical shape of adjacent tooth roots.



Note the proximity of the sinus floor to the apex of the implant

Landmarks in the maxilla such as the sinus floor: A safety distance of **2 mm** is recommended from the floor of the sinus to the apex of the implant. Straumann® Smart users are advised to treat straightforward cases only. If this minimum distance of bone is not available, the patient should be referred to a clinician with adequate training and experience in sinus floor elevation (SFE) procedures.

Maintain a minimum safety distance of 2 mm from the implant to the maxillary sinus floor.



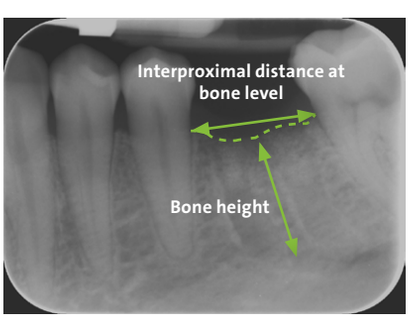
Note the anatomical landmarks in the mandible shown by the pencil markings

Landmarks in the mandible: 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 minimum safety distance of 2 mm from the implant to the mandibular canal or mental foramen.

3.2.2 Interproximal distance of bone at the crestal bone level (interradicular space)



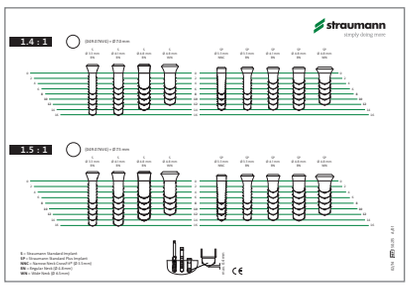
Pay attention to the interproximal distance of bone at bone level.

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.

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



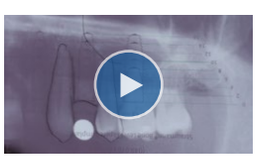
This can be done with the help of the Straumann® X-ray Reference Sphere and X-ray Templates for Straumann® Standard Plus Implants and Straumann® Bone Level Tapered Implants.

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

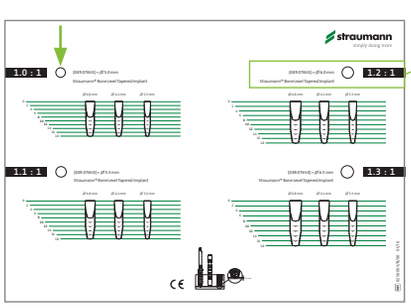


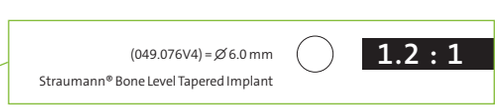
3.3.1 Compare the size of the X-ray Reference Sphere*

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.

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

*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

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 the implant. Make sure you do this measurement in line with the axis of the 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 anatomic structures (e.g. mandibular canal, sinus maxillaris, etc.)

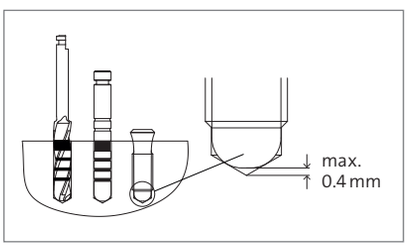
$$\frac{5\text{ mm} \times 13\text{ mm}}{6\text{ mm}} = 10{,}8\text{ mm}$$

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.

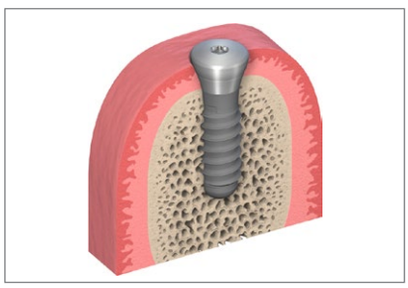
3.3.3 Consider the additional length of the drill tip



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

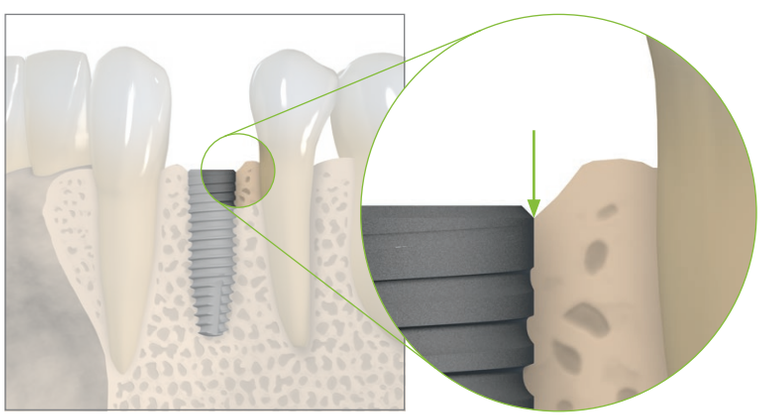
3.3.4 Consider the coronoapical (vertical) implant position



The Standard Plus 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.

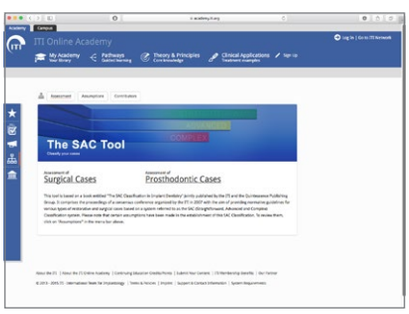


4. Risk assessment

After collecting all relevant information of the patient history and after performing a comprehensive clinical and radiographic examination and study model analysis, assess the complexity and risks associated with placing an implant in your patient's mouth.

The SAC classification system developed by the ITI (International Team of 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 pre-requisites for a straightforward single tooth case:

- Single tooth gaps (including free-end situations) in the posterior non-esthetic zone
- Healthy patient (ASA²-1: a normal healthy patient; or ASA²-2, a patient with mild systemic disease) with undisturbed wound healing capability
- Good patient motivation and compliance, preferably a non-smoker
- No active periodontitis or occlusal parafunction
- Healed ridge (≥ 4 months post-extraction) with sufficient bone volume
- Conventional loading protocol (≥ 3 months after implant placement)
- Sufficient interproximal distance of bone for the regular platform (RN or RC) implants or wide neck platform (WN) implants
- Sufficient bucco-lingual or bucco-palatal bone width and height for placing implants without the need for bone augmentation
- Sufficient inter-occlusal distance for the prosthetic restoration
- Minimum vertical oral opening space of 30 mm to allow access with surgical instruments

Ensure that the pre-requisites of a straightforward implant case are fulfilled.

⚠ **Caution:** Any pathologic condition such as caries, periapical infections, temporomandibular joint disorders or oral mucosal lesions should be treated prior to implant placement.

In cases of residual probing depths (PD) ≥ 5 mm with concomitant bleeding on probing, 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 the remaining dentition to discuss with the patient.

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.

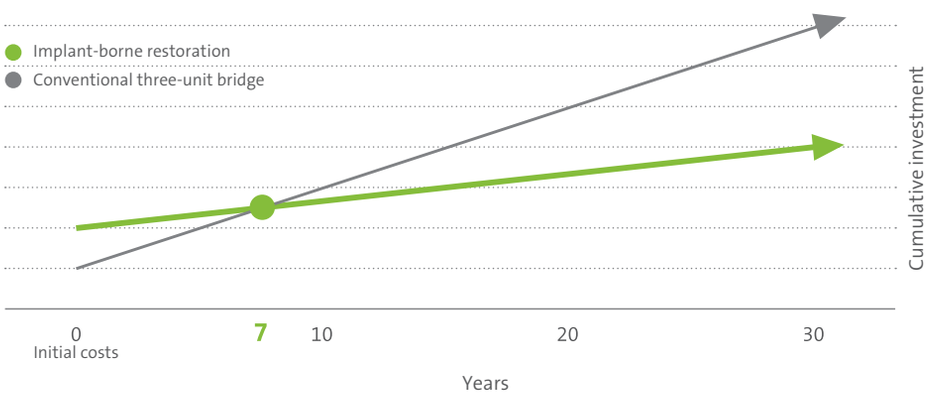
- All diseases in the oral cavity (hard and soft tissue) have to be treated before implant placement starts.
- In case of insufficient oral hygiene or active periodontal disease, additional dental treatment may be needed before starting with the implant procedure, and should be calculated into the cost proposal. Consider this when:
  - the patient presents with poor oral hygiene
  - there is active periodontal disease, requiring professional plaque removal along with scaling and root planing
  - there are teeth with hopeless prognosis which have to be extracted
  - there is active caries
  - there are failing endodontically treated teeth
  - there are stomatological lesions

At the end of the proposed additional dental treatment, you should re-evaluate and make a decision regarding the subsequent steps for implant treatment.

5.3 Calculate costs and write up a cost proposal.

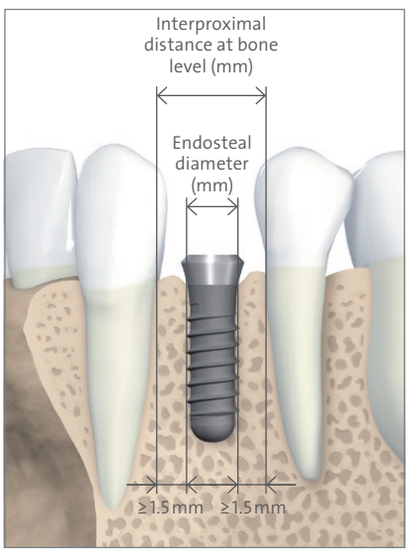
- Analyze and calculate the approximate total costs for the surgical treatment in comparison to alternative treatment modalities.
  - Dental implants are a cost-effective alternative to conventional restorations and improve the quality of life of the patient[3].
  - Especially for single-tooth replacements, an implant is to be regarded as a cost-effective treatment option in comparison to a traditional three-unit fixed dental prosthesis[4].

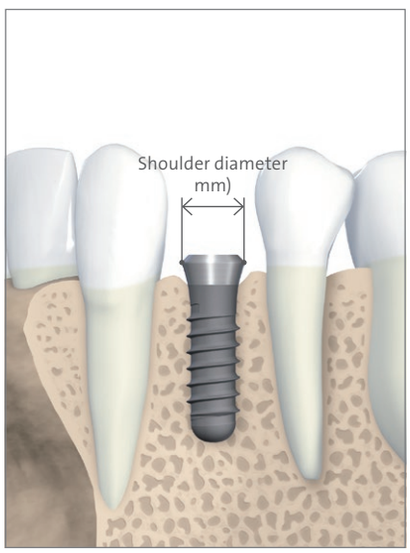
A cost estimate is important for discussion with the patient.



Graph: After 7 years, the costs for a single-tooth restoration pay off and the long-term maintenance costs are lower than for a conventional bridge[4].

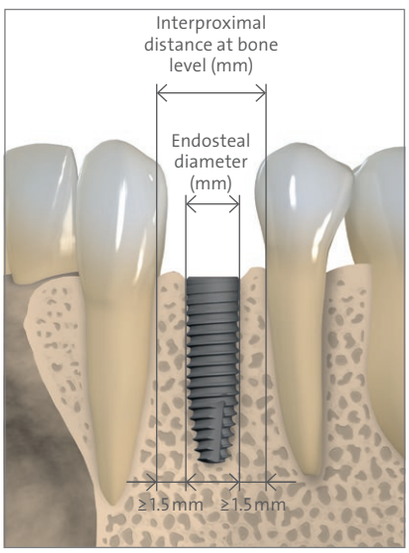
Chart of minimum widths of bone for planning which SP Implant (RN/WN) to use





Implant type (endosteal diameter)		Shoulder diameter (mm)	Interproximal distance at bone level (mm)	Bucco-lingual or bucco-palatal width of bone (mm)	Recommended use for Straumann® Smart cases
SP ∅ 3.3 mm RN		4.8	6.5	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. **Specific indications for Titanium SLA® ∅ 3.3 mm Standard Plus RN Implants:** These implants are to be used only in cases for the following indications: • Partially dentate jaws with implant-borne, fixed constructions: Combine with implants ∅ 4.1 mm and splint the suprastructure.
SP ∅ 4.1 mm RN		4.8	7	6	For use in the maxilla and mandible, for restoration of partially or fully edentulous patients.
SP ∅ 4.8 mm RN		4.8	8	7	For use in the maxilla and mandible, for restoration of partially or fully edentulous patients in wide interdental spaces and bony ridges.
SP ∅ 4.8 mm WN		6.5	8	7	

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



For BLT Implants, the shoulder diameter is the same as the endosteal diameter at bone level.

Implant type (endosteal diameter)		Shoulder diameter (mm)	Interproximal distance at bone level (mm)	Bucco-lingual or bucco-palatal width of bone (mm)	Recommended use for Straumann® Smart cases
BLT ∅ 3.3 mm NC		3.3	6.5	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	7	6	For use in the maxilla and mandible, for restoration of partially or fully edentulous patients.
BLT ∅ 4.8 mm RC		4.8	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

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