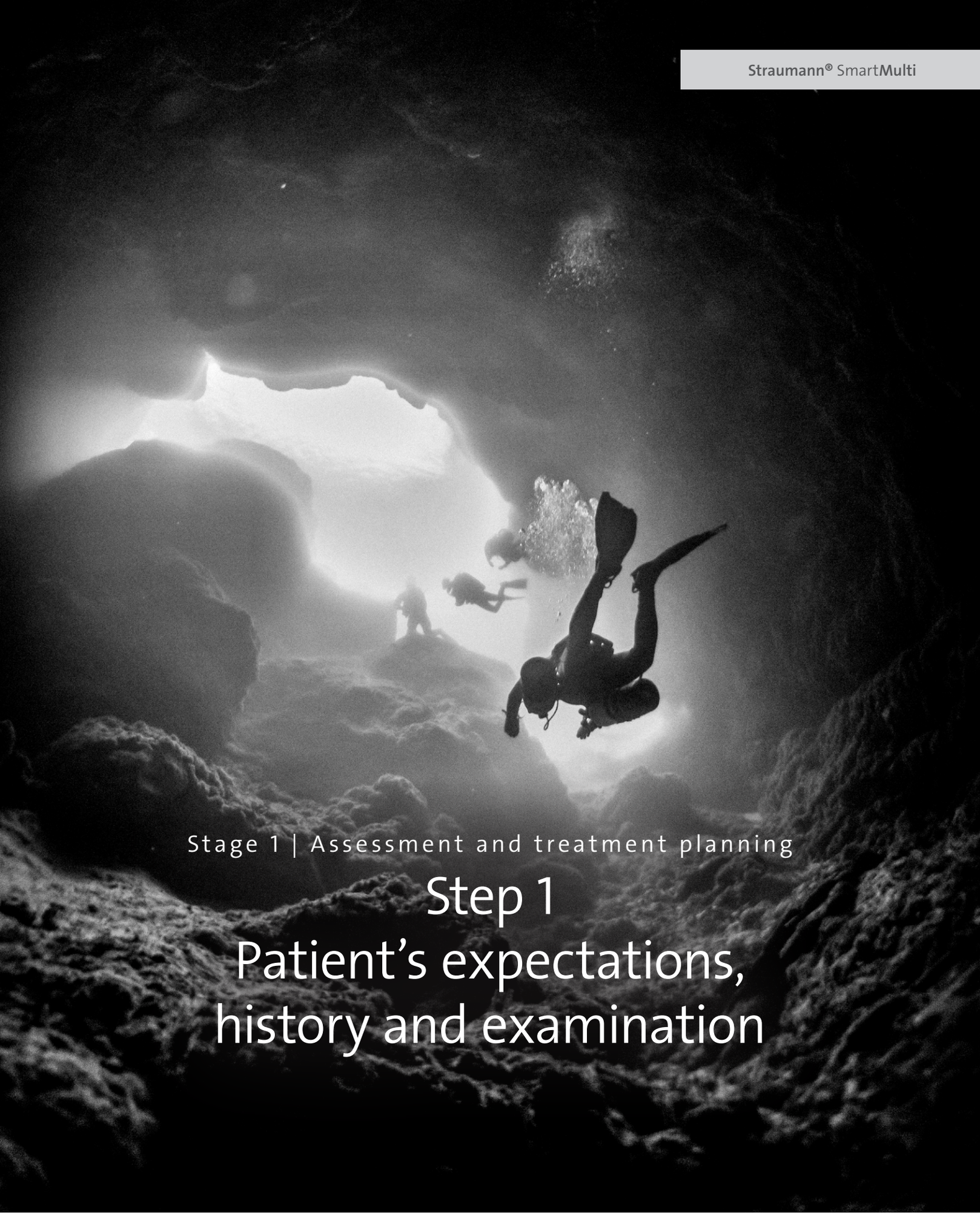
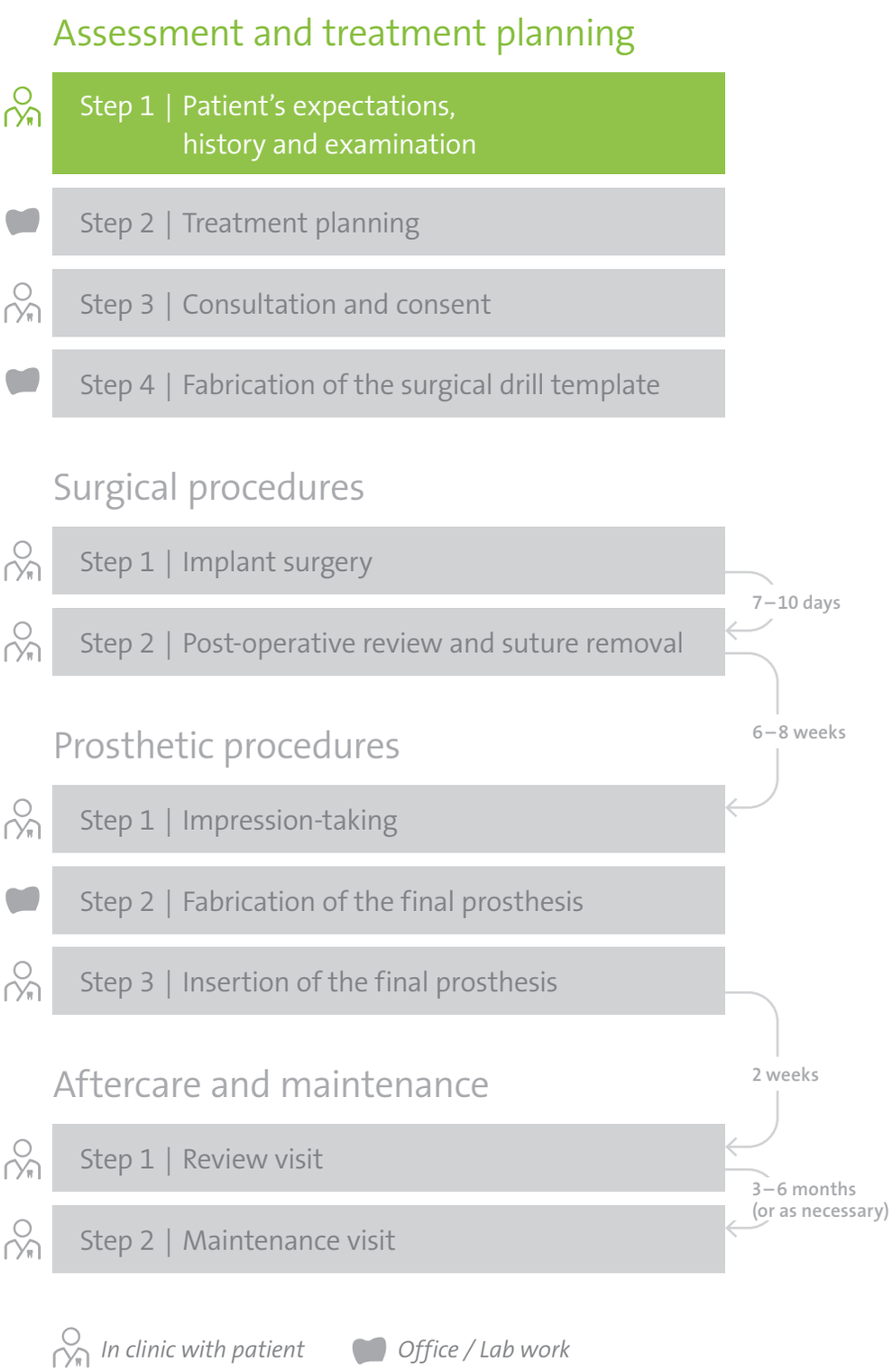


Stage 1 | Assessment and treatment planning

Step 1
Patient's expectations, history and examination

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

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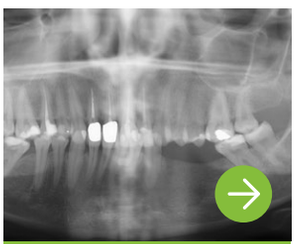
Appendix 29

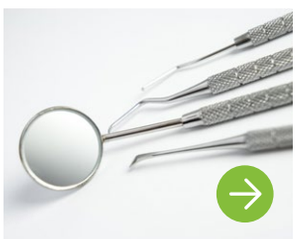
Introduction

Successful implant treatment starts with the history and examination of the patient and understanding the patient's expectations. This step comprises three essential elements for creating an accurate patient assessment, diagnosis and proper treatment plan:



1. Patient history

A fully comprehensive patient medical and dental history, to gather profound knowledge of the patient's wishes, expectations and medical risk factors.



2. Examination

A thorough clinical and radiographic examination, to gather information about the extraoral and intraoral situation to help formulate the diagnosis and treatment plan.

3. Provisional diagnosis and tentative treatment plan

A discussion with the patient about the diagnosis, treatment options and costs, will help the patient make an informed decision about their treatment.

History and examination comprises:

- Patient's expectations
- Patient history
- Examination
- Provisional diagnosis and tentative treatment plan

Click on the graphic to go directly to the chapter.

Using this systematic approach, you will be able to identify potential risk factors and/or contraindications for implant treatment. From the findings in this visit, you can discuss with the patient about their general dental health status and possible treatment options. This will help both you and the patient to have a mutual understanding regarding requirements, expectations as well as limitations, and to prepare for upcoming treatment sessions. All findings and discussions should be documented in the patient's records and dated for future reference.

Be systematic in identifying risk factors and contraindications.

Learning objectives

- Be able to conduct a structured patient assessment to gather details of the patient's medical and dental history.
- Recognize the absolute and relative general and medical contra-indications for implant treatment.
- Conduct a thorough extraoral and intraoral clinical examination, and look for site-specific factors which are relevant for implant treatment planning.
- Be aware of success and survival rates of different treatment options to be able to discuss the benefits and risks of treatment with the patient.

1. Patient history

The knowledge of former and current diseases, surgeries, and medications helps you identify patients at risk. **Should you have any doubts or concerns or if the patient has any serious internal medical problems, always consult the patient's physician or medical specialist for further clarification[1].**

Risk assessment starts with a good knowledge of the patient's medical history.

Various systemic conditions and their treatments are risk factors in implant therapy[1]. These factors can determine whether or not a patient is suitable for implant placement[2]. The level of evidence supporting absolute and relative contraindications for oral implant therapy due to systemic conditions and treatments is low. The largest amount of information exists for diabetes mellitus, osteoporosis, and radiotherapy.

Be aware of the risk factors in implant therapy.

Always read the instructions for use of any product that you are considering to use in the patient's treatment.

1.1 Absolute contraindications for implant placement[3,4]

If one or more of the following serious internal medical problems is present, you should **consider non-surgical treatment alternatives to restore the patient's dentition** or **refer the patient to a specialist oral surgeon:**

Avoid implant treatment if the patient has any of these absolute contraindications.

- Recent myocardial infarction or cerebrovascular accident (≤ 6 months ago)
- Valvular prosthesis surgery (≤ 6 months ago)
- Previously irradiated bone in the head or neck area
- Intravenous bisphosphonate therapy
- Ongoing chemotherapy
- High-dose immunosuppressive therapy
- Allergies to implant materials (e.g., Titanium Grade 4)
- Lack of compliance
- Incomplete maxillary and mandibular growth
- ASA[5] 5 or 6

1.2 Relative general and medical contraindications

- Poor general state of health
- Uncooperative and/or unmotivated patient, with inadequate oral hygiene
- Uncontrolled diabetes mellitus
- Uncontrolled bleeding disorders or patient's on antithrombotic medication
- Immunocompromised patient
- Bone metabolism disturbances
- Prolonged therapy-resistant functional disorders (e.g., craniomandibular disorders)
- Inadequate wound healing capacity
- Tobacco, drug or alcohol abuse
- Oral bisphosphonate therapy
- Allergies to local anesthetics which may require referral to a specialist
- Pathologic diseases of the jaw or oral mucosa, or unfavorable anatomic bone conditions
- Uncontrolled periodontitis
- Acute infection of proposed implant site
- Severe bruxism or parafunctional habits
- Local root remnants
- Pregnancy
- Psychoses

Consider if the benefits of implant treatment outweigh the risk of complications and be able to discuss this with the patient.

As smoking and periodontitis are commonly encountered risk factors when assessing a patient for implant treatment, here is more discussion about these two topics:

1.3 Smoking as a risk factor for implant therapy[6]

Smoking is **not an absolute contraindication** for implant placement but it lowers the survival and success rates of implants. It is also a risk factor for general and oral health. Smoking has a long-term chronic effect on the immune system and inflammatory processes. Some deleterious effects of smoking include: impaired wound healing, reduced collagen production, impaired fibroblast function, reduced peripheral circulation, and compromising of function of neutrophils and macrophages[6].

Smoking lowers the survival and success rates of implants[6].

Smokers have approximately:

- 4-5 times higher risk of peri-implantitis compared with non-smokers.
- 2-10 times higher risk for progressive bone loss than non-smokers.
- Reduced implant survival rates compared to non-smokers.

Smoking can increase the risks[6] of:
– peri-implantitis
– progressive bone loss
– implant loss

Therefore, motivating the patient to quit smoking will be beneficial both for implant treatment and their general health.

Motivate your patient to stop smoking.

1.4 Periodontitis as a risk factor for implant therapy[6]

Implant placement in patients with a history of periodontitis is not contraindicated, as the majority of studies reports implant survival rates at over 90 %. However, there is a **3-4-fold** increased risk of developing peri-implantitis. Microbial colonization following implant placement has been shown to occur within a short period of time; the composition of microbiota within the peri-implant sulcus is similar to that found at neighboring teeth in partially dentate patients. Successful treatment of periodontitis prior to implant placement and individualized maintenance care following implant treatment is important.

Periodontitis can increase the risk of peri-implantitis[6].

Successful treatment of periodontitis is a prerequisite for implant treatment.

1.5 Combined risk factors

One single factor alone may not influence the risk of treatment failure measurably, whereas a combination of multiple independent factors may have a significant impact on the treatment outcome.

Several risk factors may increase the overall risk of treatment failure.

1.6 Checklist for patient history

For a thorough patient history, you may use this example of a Clinical Record Form to document the following:

Example of a clinical record form

☐ **Patient's chief complaint and expectations**

During this first visit, discuss in detail the following questions with your patient:

- Why is the patient here, what is his or her primary objective?
- What is the patient's chief complaint?
- What are their expectations regarding the treatment outcome in terms of esthetics, health and function?
- What does the patient know about implant therapy? Are their knowledge and expectations realistic?

☐ **Medical history**

Before planning surgery, the patient's general psychological and physical health status should be carefully assessed. It is important to record, regularly check and update all such information in the patient's notes. In case of significant medical issues, the patient's physician should be consulted for further details.

You may use this example of a Medical Record Form to document a comprehensive list of information about the patient's medical history. It is helpful to ask the patient to bring a list of their current medications during this visit.

Example of a medical record form

☐ **Dental history**

- Previous dental care, especially number of existing dentures
- Reasons for tooth loss
- History of treated periodontitis
- Oral hygiene and denture wearing habits

☐ **Social and family history**

- Financial context
- Genetic predisposition

☐ **Habits**

- Parafunctional activity (e.g., bruxism)

☐ **Motivation and compliance**

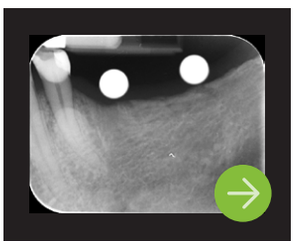
- Patient's motivation to invest time and money in oral health
- Frequency of oral hygiene procedures

2. Examination

A thorough examination for accurate diagnosis and treatment planning includes the following:

2.1 Clinical examination

- General
- Site-specific



2.2 Radiographic examination

- X-ray template
- General
- Site-specific

2.3 Additional investigations

- Impressions for analysis of study models
- Intraoral photographs

Accurate diagnosis and treatment planning requires:

– Clinical examination
– Radiographic examination
– Additional investigations

2.1 Clinical examination

2.1.1 General

These parameters should be assessed to make a thorough diagnosis and treatment plan:

- Extraoral and intraoral hard and soft tissues: swelling or lesions, asymmetries, function and palpation of head and neck musculature, temporomandibular joint
- Oral hygiene status
- Dental, periodontal and restorative condition of remaining teeth: caries, vitality testing, tooth misalignment, fractures, attrition, abrasion, abfraction, periodontal status (probing pocket depth, mobility, bleeding on probing, furcation involvements)
- Occlusion and function: vertical dimension of occlusion, maxillo-mandibular relationship (Angle's classification), overbite, overjet, centric relation, slide-in-centric, lateral and anterior excursive contacts (canine guidance, group function, anterior guidance), signs and symptoms of temporomandibular joint disorders

General clinical examination: Systematically examine the patient.

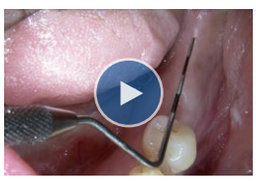
2.1.2 Site-specific

A three-dimensional space assessment and evaluation of the condition of the adjacent teeth and the surrounding hard and soft tissues is necessary for provisional diagnosis. There are 4 parameters to consider:

Site-specific clinical examination: Assess the three-dimensional space.

2.1.2.1 Interproximal distance of bone
2.1.2.2 Bucco-lingual (or bucco-palatal) width of bone
2.1.2.3 Minimum vertical mouth opening and inter-occlusal distance
2.1.2.4 Soft tissue condition in the edentulous area

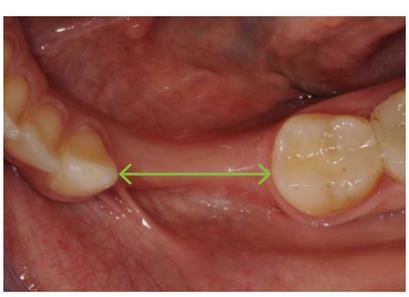
Video: Intra-oral clinical examination



A detailed and accurate space assessment is often difficult to do intraorally. We recommend to perform this diagnostic step on mounted study casts during the treatment planning step. For more details regarding diagnostic space evaluation, refer to the next step on Treatment planning.

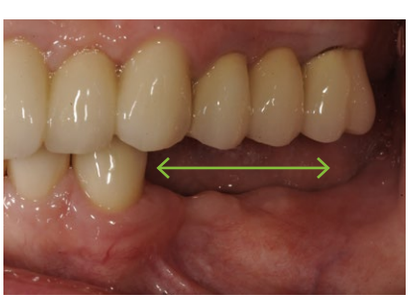
Recommendation: Assess the space on mounted study casts.

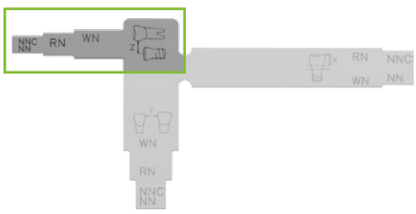
2.1.2.1 Interproximal distance of bone



Edentulous spaces should be large enough to be restored with an implant-supported 3-unit fixed dental prosthesis (FDP). Implant restorations should ideally have the same mesiodistal width of the lost natural teeth.

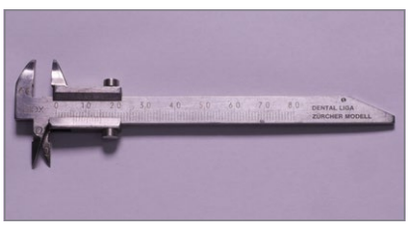
The space available should fit the width of the natural missing teeth.





Use the **Straumann® Diagnostic T** and calipers in the patient's mouth to estimate if adequate space is available for a 3-unit fixed dental prosthesis.

To estimate the available space use the Straumann® Diagnostic T and calipers.



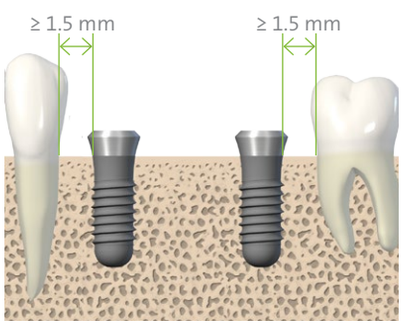
Caution: Currently, a Diagnostic T for Straumann® Bone Level Tapered (BLT) Implants is not available.

Measuring the minimum gap size for two implants in a multiple tooth gap:

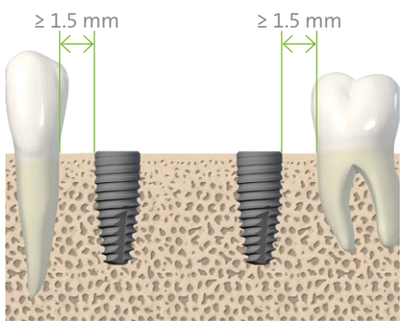
In a multiple tooth gap or free-end situation, a **minimal distance of 1.5 mm of bone** from the implant to the adjacent tooth **at bone level** (mesial and distal) is required. This will help to preserve bone and soft tissue to create a restoration with adequate emergence profile and soft tissue attachment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

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

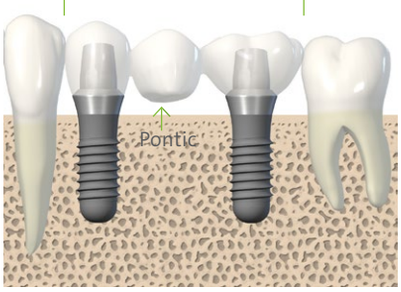
SP Implants



BLT Implants



3-unit FDP



For a 3-unit implant-supported fixed dental prosthesis (FDP) in the posterior area, additional space for the **pontic** should be respected in the calculations[7].

- The approximate diameter of a **premolar** is **7.0 mm**
- The approximate diameter of a **molar** is **11.0 mm**

For a 3-unit implant-supported FDP respect additional space for the pontic:
- approx. Ø of a premolar: 7 mm
- approx. Ø of a molar: 11 mm

A diagnostic wax-up is strongly recommended for the next step of Treatment planning.

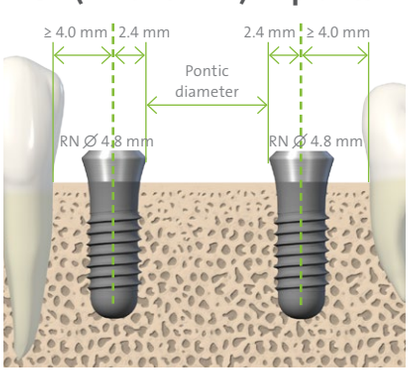
A diagnostic wax-up is strongly recommended for the treatment planning.

The minimum distance from the bone level of the adjacent tooth to the implant's central axis depends on the shoulder or platform of the implant used. *These numbers have been rounded up in the calculations.*

With **SP (RN/WN) Implants**, this distance is approximately:
- **4 mm** for Regular Neck (**RN**) Implants with **Ø 4.8 mm shoulder diameter**.
- **5 mm** for Wide Neck (**WN**) Implants with **Ø 6.5 mm shoulder diameter**.

Minimum distance from the bone level of adjacent tooth to the implant's central axis:
SP Implants:
4 mm for RN platform
5 mm for WN platform
BLT Implants:
4 mm for RC platform

SP (RN and WN) Implants



Example of a 3-unit implant-supported FDP with SP Implants with Regular Neck (RN) Ø 4.8 mm shoulder diameter.

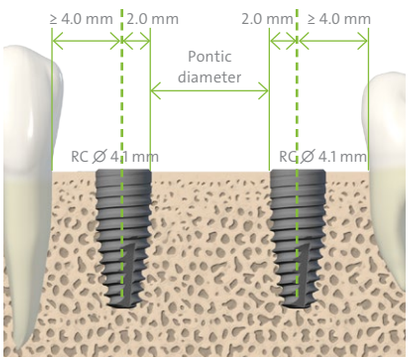
Chart of minimum widths of bone for planning which SP Implants (RN/WN) to use

Chart for reference for SP Implants

With **BLT (RC) Implants**, this distance is approximately:

- **4 mm** for Regular CrossFit® (**RC**) Implants with **Ø 4.1 mm** or **Ø 4.8 mm shoulder diameter**.

BLT (RC) Implants



Example of a 3-unit implant-supported FDP with BLT Implants with Regular CrossFit® (RC) Ø 4.1 mm endosteal and shoulder diameter.

Chart of minimum widths of bone for planning which BLT Implants (RC) to use

Chart for reference for BLT Implants

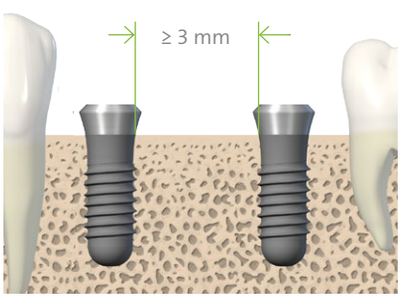
Caution: We do not recommend the use of a Ø 3.3 mm endosteal diameter implant in the posterior region due to the strength of masticatory forces in this area.

Caution: If the space is too small for a 3-unit implant supported bridge, consider placing 2 adjacent implants with a minimal distance of 3 mm between the implants at bone level.

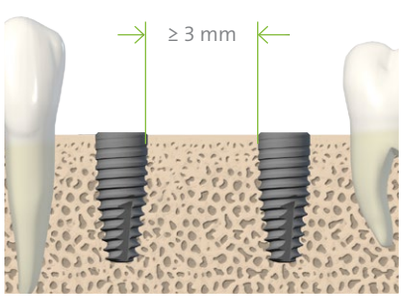
A minimal distance of **3 mm between two adjacent implants** is required at bone level. This minimal distance is mandatory to facilitate flap adaptation, avoid proximity of secondary components and provide adequate space for maintenance and home-care.

Minimum distance of bone between two adjacent implants: 3 mm.

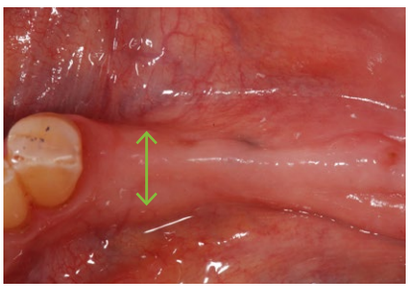
SP Implants



BLT Implants

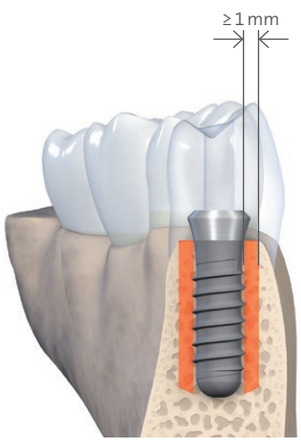


2.1.2.2 Bucco-lingual (or bucco-palatal) width of bone



A restoratively-driven orofacial implant position and axis is important in planning for implant-supported restorations. This can be done by:

- Assessing the contour of the ridge by palpation
- Visually evaluating the available orofacial space for an implant
- Being aware of the presence of concavities (lingual and/or buccal undercuts)



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

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

Charts for reference

Chart of minimum bucco-lingual or bucco-palatal width of bone for SP Implants.

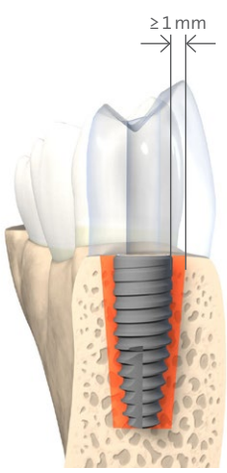
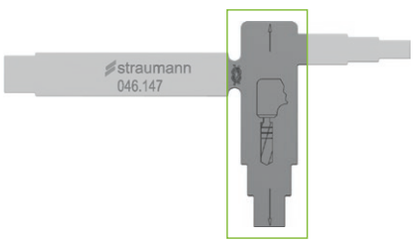


Chart of minimum bucco-lingual or bucco-palatal width of bone for BLT Implants.

If the overlying tissue is fibrous or thick, accurate assessment may be difficult with visual assessment and palpation. Probing of the local tissues with an endodontic file with a rubber stop under local anesthesia may be indicated to assess soft tissue thickness and to confirm the presence of sufficient alveolar bone.

Bone mapping with endodontic files can be helpful.

2.1.2.3 Minimum vertical mouth opening and inter-occlusal distance



Minimum vertical space requirement for access with surgical instruments

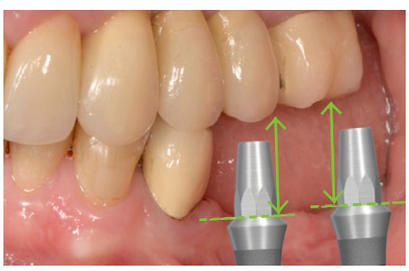
A **minimum vertical mouth opening** distance of 30 mm is required for access with surgical and prosthetic instruments. The Straumann® Diagnostic T is a useful tool to help assess this intraorally.

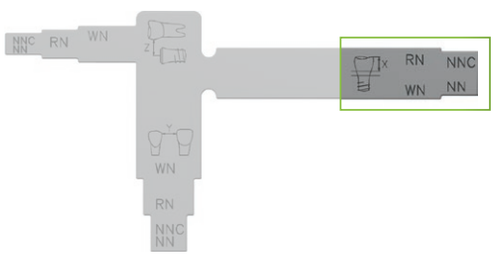
Minimum vertical mouth opening: 30 mm.

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

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

Space requirements depend on the design of the restoration, including the selection of abutments and crowns. We recommend to 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.

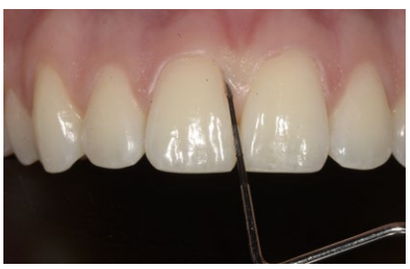




Caution: If the inter-occlusal distance is insufficient for the planned restoration, other restorative interventions such as minimal enameloplasty or orthodontic intervention may be indicated. Such cases are considered advanced or complex[8], and should be handled only by experienced clinicians.

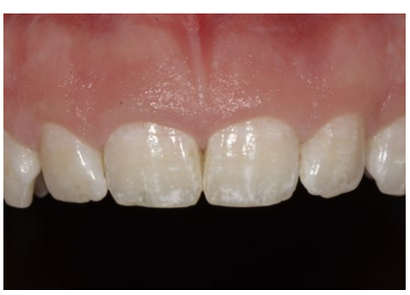
Insufficient inter-occlusal distance requires an expert opinion.

2.1.2.4 Soft tissue condition in the edentulous area



The tissue biotypes are classified according to how thick or thin the supporting bone and gingival soft tissues are. The health, form and metrics of gingival biotypes[9] can be assessed by using a periodontal probe.

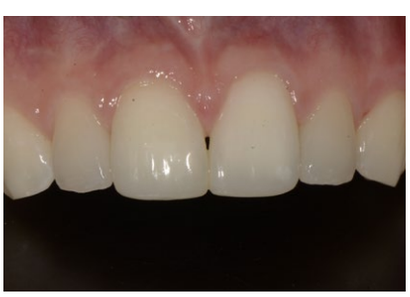
Understand the differences between thick and thin soft tissue biotypes.



Compared to the thin gingival biotype, the **thick gingival biotype** characteristics are:

- Thicker tissues
- Periodontal probe is not visible
- Broader band of attached gingiva
- Less scalloped gingiva
- Easier to manipulate
- Provides a more predictable esthetic outcome
- More resistant to recession

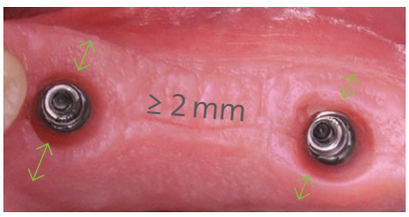
Characteristics of the thick gingival biotype.



Compared to the thick gingival biotype, the **thin gingival biotype** characteristics are:

- Reduced soft tissue thickness
- Periodontal probe is visible
- Highly scalloped gingival architecture
- More prone to soft tissue recession and buccal plate resorption

Characteristics of the thin gingival biotype.



An adequate collar of keratinized tissue of **at least 2 mm** circumferentially to the implant provides a protective cuff around the implant to[10]:

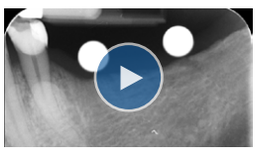
- Resist trauma from mastication
- Make it less susceptible to gingival recession
- Allow for more convenient prosthetic procedures and oral hygiene measures

There should be at least 2 mm of keratinized mucosa around the planned implants.

Caution: More plaque and inflammation is found around implants surrounded by keratinized mucosa thinner than 2 mm[11].

2.2 Radiographic examination

Standard dental radiographs allow you to make an initial assessment of the bone levels available for implant treatment, however, these 2-dimensional images give no indication of ridge width.

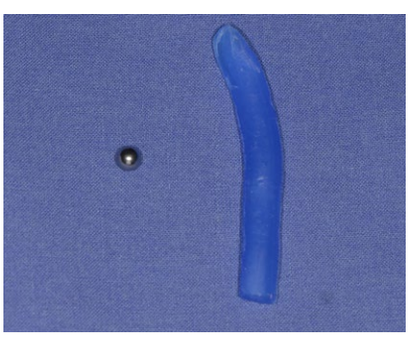


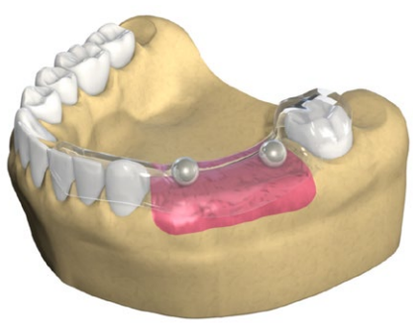
Video: Radiographic examination using Straumann® X-ray Reference Spheres

2.2.1 X-ray template

The Straumann® X-ray Reference Sphere can be used when taking site-specific radiographs. It can easily be applied with some dental wax within the gap or with a sphere-carrying template fabricated by the dental lab in advance. This is used in order to assess the distortion factor when using the radiograph to plan for which implant should be used.

Determine the correct distortion factor for radiographic planning with the Straumann® X-ray Reference Sphere.



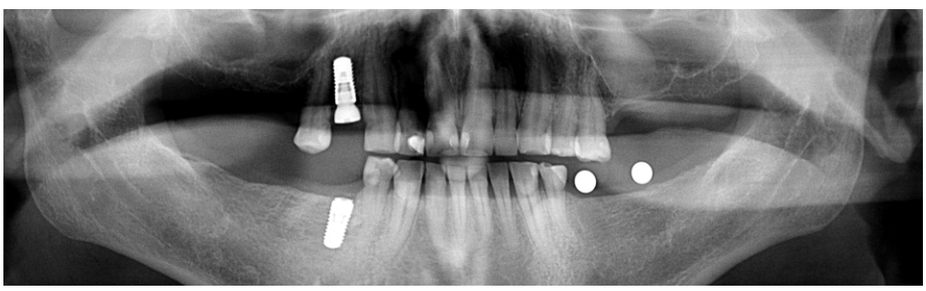


Caution: The X-ray Reference Sphere cannot compensate for the distortion that occurs due to bending of the radiographic film when taking a periapical or incorrect angle of the X-ray tube. Always use a parallel long-cone technique.

2.2.2 General

The condition of the remaining teeth, the edentulous area and neighboring vital structures (tooth roots, nerve canals and foramina, etc.) must be assessed. Inflammatory lesions in the vicinity of an implant site may compromise the implant treatment.

Assess for relevant anatomical structures and pathology.



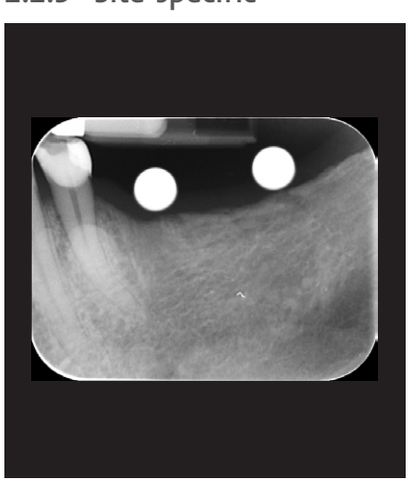
Panoramic radiographs provide an overview of:

- Anatomical anomalies or pathological lesions
- Overall status of teeth and supporting bone
- Available bone height
- Location of the inferior alveolar nerve canal
- Size and position of the maxillary sinus and nasal cavity

Panoramic radiographs help you visualize important aspects for implant treatment.

⚠ **Caution**: Such images are subjected to distortion (up to 25 % magnification) and superimposition of other anatomical structures (zygoma, throat, tongue, spinal column). The magnification in panoramic images varies between different types of panoramic machines and must be considered accordingly.

2.2.3 Site-specific



Intraoral periapical radiographs:
The parallel long-cone technique will help to accurately assess and measure the available mesio-distal and vertical bone. This method also helps to provide an image with minimal distortion.
For more detailed radiographic examination, refer to Step 2 Treatment planning.

Use the long-cone paralleling technique when taking periapical radiographs.

⚠ **Caution:** The X-ray Reference Sphere cannot compensate for the distortion that occurs due to bending of the radiographic film when taking a periapical or incorrect angle of the X-ray tube. Always use a parallel long-cone technique.

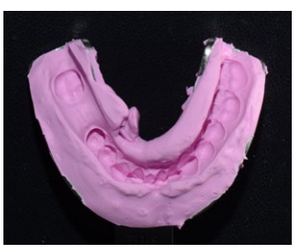
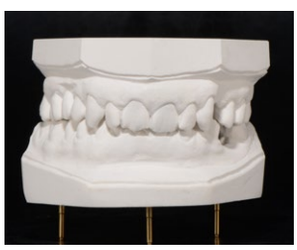
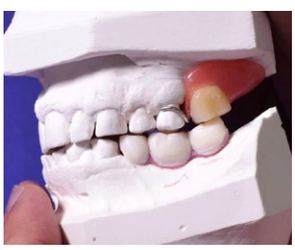
2.3 Additional investigations

2.3.1 Impressions for analysis of study models

Take impressions for study models.

For treatment planning, impressions can be taken to create mounted study models for:

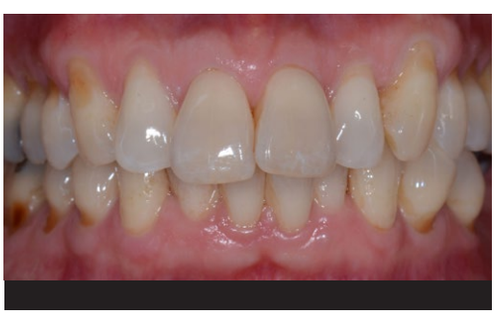
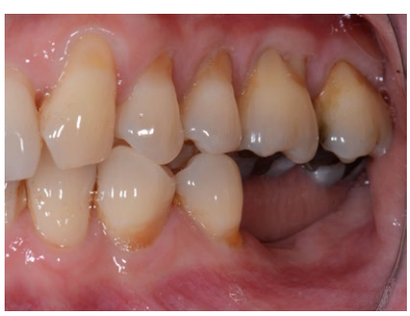
- Analysis of the occlusion
- Assessment of available space
- Assessment of other factors that might not be easily noted or recorded at the chairside
- Creation of a diagnostic wax-up
- Creation of an X-ray template

2.3.2 Intraoral photographs

Take baseline intraoral photographs.

Intraoral photographs may also be helpful during treatment planning and to keep a record of the patient's initial dentition prior to treatment.

2.4 Summary of considerations in the patient history and initial examination

Before making a diagnosis and treatment plan for the patient, consider these pre-requisites for a straightforward case using the Straumann® SmartMulti solution:

Understand the prerequisites for straightforward implant cases in multiple tooth gaps in the posterior non-esthetic zone.

1. Multiple tooth gaps (including free-end situations) in the posterior non-esthetic zone
2. Healthy patient (ASA[5]-1: a normal healthy patient, or ASA[5]-2, a patient with mild systemic disease) with undisturbed wound healing capability
3. Good patient motivation and compliance, preferably a non-smoker
4. No active periodontitis or occlusal parafunction
5. Healed ridge (≥ 4 months post-extraction) with sufficient bone volume
6. Conventional loading protocol (≥ 3 months after implant placement)
7. Sufficient mesio-distal width of bone for the regular platform (RN or RC) implants or wide neck platform (WN) implants
8. Sufficient bucco-lingual or bucco-palatal bone width and height for placing implants without the need for bone augmentation
9. Sufficient inter-occlusal distance for the prosthetic restoration
10. Minimum vertical oral opening space of 30 mm to allow access with surgical instruments

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.

2.5 Checklist for examination

CLINICAL EXAMINATION

Checklist for clinical examination

☐ Conduct the general clinical examination thoroughly. You may use this example of a Clinical Record Form.

☐ Conduct the **site-specific clinical examination** as follows:

☐ **Interproximal distance of bone**
- Use the Straumann® Diagnostic T and calipers in the patient's mouth to estimate if adequate space is available for a 3-unit fixed dental prosthesis (FDP), and to assess the prosthetic platform of the future implants.

☐ **Bucco-lingual (or bucco-palatal) width of bone**
- Assess the contour of the ridge by palpation.
- Visually evaluate the available orofacial space for an implant.
- Check for concavities or lingual undercuts.

☐ **Minimum vertical mouth opening and inter-occlusal distance**
- Use the Straumann® Diagnostic T in the patient's mouth to measure the minimum vertical mouth opening distance.
- Discuss with your dental technician about the options of abutments and materials for the final restoration in order to have a restoratively-driven treatment plan.
- Measure the inter-occlusal distance from the future implant shoulder to the opposing tooth. This can also be done with the Straumann® Diagnostic T to determine if there is enough occlusal space for the final restoration.
- Be aware of overeruption of the opposing dentition.
- Check the occlusion in relation to the opposing dentition and be aware of cross-bite situations.

☐ **Soft tissue condition in the edentulous area**
- Use a periodontal probe to assess the health, form and metrics of the gingival biotype.
- Assess the width of the keratinized mucosa with a periodontal probe.

⚠ **Caution:** Always select the largest-diameter implant that can be supported by the available bone thickness, bone quality, interdental spacing, and anticipated mastication forces.

RADIOGRAPHIC EXAMINATION

- ☐ **X-ray template:** Create a template with Straumann® X-ray Reference Spheres to carry out radiographic examination.
- ☐ **General:** Take a panoramic X-ray of the patient if indicated.
- ☐ **Site-specific:** Take a periapical X-ray of the implant sites with the template with Straumann® X-ray Reference Spheres.

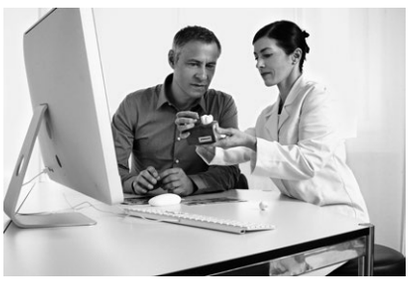
Checklist for radiographic examination

ADDITIONAL INVESTIGATIONS

- ☐ Take impressions (with bite registration if necessary) for study model analysis.
- ☐ Take intraoral photographs.

Checklist for additional investigations

3. Provisional diagnosis and tentative treatment plan



You may already have a provisional diagnosis and tentative treatment plan during this first visit with your patient. Your legal obligation* as a dentist is to provide your patient with information on the planned procedure, so that he or she has a clear understanding of the diagnosis and treatment options.

Provide easy-to-understand information about the planned procedure and alternative treatment options.

These are the major indications for the use of dental implants:

- Increase subjective chewing comfort
- Preserve natural tooth substance and adequate, existing reconstructions
- Replace strategically important missing teeth

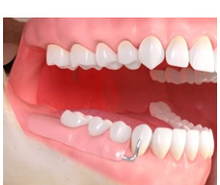
Be aware of the key indications for the use of dental implants.

3.1 Treatment options for the multiple tooth gap or shortened dental arch in the posterior region

Multiple tooth gap:

No treatment

Tooth-supported fixed partial denture (FPD)



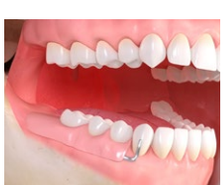
Conventional removable partial denture (RPD)

Implant-supported fixed dental prosthesis (FDP)

Be familiar with all treatment options for the posterior multiple tooth gap or shortened dental arch.

Free-end situation:

No treatment



Conventional removable partial denture (RPD)

Implant-supported fixed dental prosthesis (FDP)

* Liabilities are subject to local or regional jurisdiction. In general, the dentist providing the care is responsible for providing accurate and complete informed consent including the prognosis of the treatment, possible complications and alternative treatment options. This information to the patient should be made available prior to the procedure and not on the day of surgery. We recommend documenting this informed consent in writing.

3.2 Risks and benefits of implant treatment

Potential benefits of the implant placement should outweigh their associated risks compared to more traditional prosthodontic treatment options. While implants can be more expensive initially[12], the long-term survival is better than with a conventional fixed tooth-supported prosthesis and there are fewer long-term complications[13–16]. Hence, the patient has to make a decision on which treatment option is best suited based on the affordability of the treatment proposed versus the anticipated benefits.

Ensure that the benefits of implant treatment outweigh the associated risks compared to other restorative treatment options.

Be aware of the risks and benefits of all treatment options for a posterior multiple tooth gap or shortened dental arch.

No treatment 	• Cost savings	• Bone resorption • Elongation of opposing dentition • Tipping of adjacent teeth • Compromised masticatory function	
Tooth-supported fixed partial denture (FPD) 	• No surgery • High chewing comfort • Long-term survival rate (94 % over 5 years[13])	• High costs • Tooth substance removal • Risks for devitalization (10 % over 10 years[15,16]) • Caries on abutment teeth (10 % over 10 years) • Loss of retention (7 % over 10 years[15,16]) • Tooth fracture (3 % over 10 years[15,16]) • Difficult cleaning of pontic areas (special floss and good manual dexterity required)	• Heavily restored teeth adjacent to multiple gap
Conventional removable partial denture (RPD) 	• Reduced costs • No surgical intervention needed • Minimal tooth substance removal • Easier to clean than FPD	• Reduced chewing comfort (bulky due to required thickness for strength) • Removal for cleaning procedures • Food impaction • Visible clasps • Bone resorption in toothless area • Soft tissue recessions at adjacent teeth	• Limited financial capability
Implant-supported fixed dental prosthesis (FDPs) 	• High chewing comfort • Long-term success (FDP: 95 % after 5 years / 80 % after 10 years, Implants: 95 % after 5 years, 93 % after 10 years[14]) • Helps to preserve bone • No tooth substance removal required	• High costs • Surgical procedure with surgical risks • Frequent technical and biological complications over 5 years (33.6 %[14]) • Risk for peri-implantitis if hygiene is not adequate	• Healthy neighboring teeth (intact or only small fillings) • Adequate bone volume • Shortened dental arch

3.3 Checklist for provisional diagnosis and tentative treatment plan

Checklist for diagnosis and treatment plan

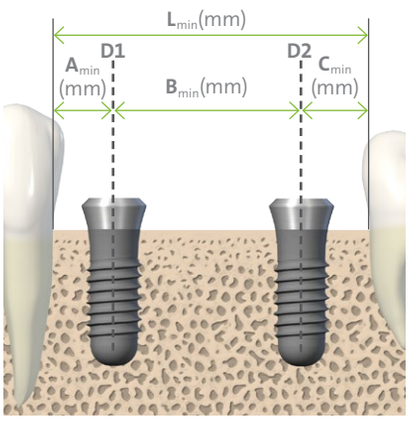
☐ **Discuss with the patient about the:**

- Diagnosis or main problems
- Treatment option(s) available
- Risks, benefits and indications of each treatment option (success and failure rates)
- Estimated cost and treatment time of each option

If not all information is present at this first visit, plan for a second visit with the patient to present the definitive treatment plan and gain his or her informed consent.

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

SP (RN and WN) Implants



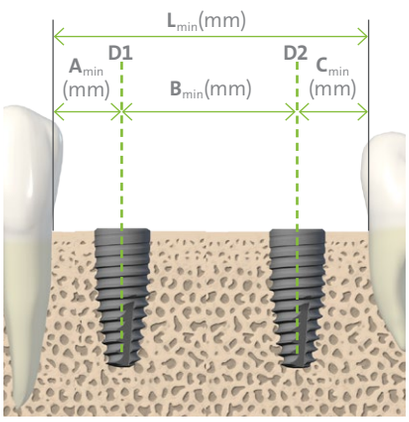
$$B_{min} = \frac{D1}{2} + \text{min. width of pontic} + \frac{D2}{2}$$

Shoulder diameter D1(mm)	Shoulder diameter D2(mm)	A_{min}(mm)	B_{min}(mm) premolar pontic	B_{min}(mm) molar pontic	C_{min}(mm)	L_{min}(mm) premolar	L_{min}(mm) molar
∅ 4.8 (RN)	∅ 4.8 (RN)	4	12	16	4	20	24
∅ 4.8 (RN)	∅ 6.5 (WN)	4	13	17	5	22	26
∅ 6.5 (WN)	∅ 6.5 (WN)	5	13.5	17.5	5	23.5	27.5

Assuming min. width of pontic is 7.0 mm for premolar and 11.0 mm for molar, calculations have been rounded up to nearest 0.5 mm.

Chart of minimum widths of bone for planning which BLT Implants (RC) to use

BLT (RC) Implants

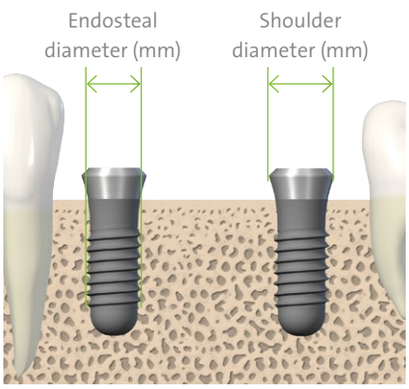


$$B_{min} = \frac{D1}{2} + \text{min. width of pontic} + \frac{D2}{2}$$

Shoulder diameter D1(mm)	Shoulder diameter D2(mm)	A_{min}(mm)	B_{min}(mm) premolar pontic	B_{min}(mm) molar pontic	C_{min}(mm)	L_{min}(mm) premolar	L_{min}(mm) molar
∅ 4.1 (RC)	∅ 4.1 (RC)	4	11	15	4	19	23
∅ 4.1 (RC)	∅ 4.8 (RC)	4	11.5	15.5	4	19.5	23.5
∅ 4.8 (RC)	∅ 4.8 (RC)	4	12	16	4	20	24

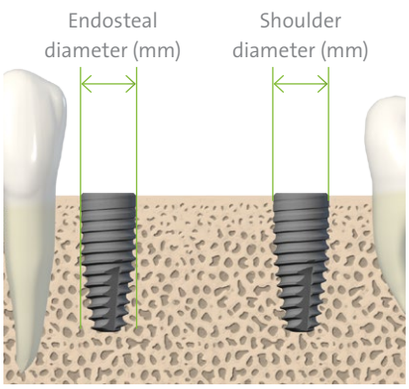
Assuming min. width of pontic is 7.0 mm for premolar and 11.0 mm for molar, calculations have been rounded up to nearest 0.5 mm.

Chart for the minimum bucco-lingual or bucco-palatal width of bone for SP Implants



SP ∅ 3.3 mm RN		4.8	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	6	For use in the maxilla and mandible, for restoration of partially or fully edentulous patients.
SP ∅ 4.8 mm RN		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.
SP ∅ 4.8 mm WN		6.5	7	

Chart for the minimum bucco-lingual or bucco-palatal width of bone for BLT Implants



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

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 1 | Patient's expectations, history and examination

REFERENCES

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

2 Bornstein MM, Cionca N, Mombelli A: Systemic conditions and treatments as risks for implant therapy.Int J Oral Maxillofac Implants. 2009;24 Suppl:12-27.

3 Hwang D & Wang H-L: Medical Contraindications to Implant Therapy: Part I: Absolute Contraindications. Implant Dentistry, 2007.

4 Mombelli A & Cionca N: Systemic Diseases Affecting Osseointegration Therapy (Review). COIR, 2006.

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

6 Heitz-Mayfield LJA et al.: History of treated periodontitis and smoking as risks for implant therapy. JOMI, 2009.

7 Major M. Ash, Stanley Nelson. Wheeler's Dental Anatomy, Physiology and Occlusion. 10th Edition, 2010 Saunders/Elsevier.

8 The SAC Classification in Implant Dentistry, 2009 Quintessence Publishing Co. Ltd.

9 Kan JY, Rungcharassaeng K, Umezu K, Kois JC Dimensions of peri-implant mucosa: an evaluation of maxillary anterior single implants in humans. J. Periodontology. 2003 Apr;74(4):557-62.

10 Thoma DS, Mühlemann S, Jung RE. Critical soft-tissue dimensions with dental implants and treatment concepts. Periodontology 2000. 2014 Oct;66(1):106-18. doi: 10.1111/prd.12045.

11 Gobbato L, Avila-Ortiz G, Sohrabi K, Wang CW, Karimbux N. The effect of keratinized mucosa width on peri-implant health: a systematic review. Int J Oral Maxillofacial Implants. 2013 Nov-Dec;28(6):1536-45. doi: 10.11607/jomi.3244.

12 Brägger U, Krenander P, Lang NP: Economic aspects of single-tooth replacement. Clin. Oral Impl. Res. 16, 2005; 335–341.

13 Pjetrusson et al.: All-ceramic or metal-ceramic tooth-supported fixed dental prostheses (FDPs)? A systematic review of the survival and complication rates. Part II: Multiple-unit FDPs. Dent Mater. 2015 Jun;31(6):624-39.

14 Pjetursson et al.: A systematic review of the survival and complication rates of implant-supported fixed dental prostheses (FDPs) after a mean observation period of at least 5 years. Clin Oral Implants Res. 2012 Oct;23 Suppl 6:22-38.

15 Sailer et al.: A systematic review of the survival and complication rates of all-ceramic and metal-ceramic reconstructions after an observation period of at least 3 years. Part II: Fixed dental prostheses. Clin Oral Implants Res. 2007 Jun;18 Suppl 3:86-96.

16 Tan K, Pjetursson BE, Lang NP, Chan ES.: A systematic review of the survival and complication rates of fixed partial dentures (FPDs) after an observation period of at least 5 years. Clin Oral Implants Res. 2004 Dec;15(6):654-66.

Assessment and treatment planning

Step 1 | Patient's expectations, history and examination

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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