BDIZ EDI

European Association of Dental Implantologists

Bundesverband der implantologisch tätigen Zahnärzte in Europa e.V.

Guideline

Preventing, detecting and treating specific complications in implant therapy

Update

20th European Consensus Conference (EuCC)
2025

2025

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Update: Preventing, detecting and treating specific complications in implant therapy

20th European Consensus Conference (EuCC) 2025

1st March 2025

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1. METHODS

1.1 Objective

The purpose of this guide is to provide recommendations for clinicians active in implant dentistry, enabling the prevention, early detection and treatment of complications in order to optimize the patient outcome.

1.2 Introduction

All consensus recommendations in this paper should be interpreted as guidelines only. The patient's specific situation is always an important aspect and may justify deviations from the recommendations of this consensus paper.

1.3 Background

Implant placement is a proven way to replace missing teeth and to restore function and aesthetics. Nevertheless, complications may occur at various stages of treatment flow. Earlier guidelines covered surgical complications that might be harmful to anatomical structures; a risk analysis; and avoiding implant malpositioning considering further therapeutic needs. This guideline focuses on less frequently encountered risk factors that may arise at various treatment stages

1.4 Literature search

The Cochrane Library, EMBASE, DIMDI and Medline literature databases were used to conduct a systematic search of recent published data. Selective search criteria were used, including terms such as *complication, dental implant, meta-analysis.*

The publications identified with the search were screened by reading their abstracts and those irrelevant to the subject were identified and excluded. Those articles found to be potentially relevant were obtained in full-text form. Multiple review papers with meta-analyses were available on the subject.

1.5 Procedure for developing the guideline/consensus conference

A preliminary version of this document on which the EuCC based its deliberations was prepared and authored by Professor J. Neugebauer, University of Cologne, Faculty of Medicine and University Hospital Cologne,

Department for Oral and Craniomaxillofacial and Plastic Surgery. The preliminary report was reviewed and discussed by the committee members in five steps, as follows

- Reviewing the preliminary draft
- Collecting alternative proposals
- Voting on recommendations and levels of recommendation
- Discussing non-consensual issues
- Final voting

2. PROBLEM

The outcome of implant therapy depends on the health status of the patient, including medication and nutritional status and the planned procedures and prosthetic restorations. From a surgical point of view, the use of surgical guides and grafting procedures may lead to complications. The recommendations for immediate loading require a high insertion torque, which is also a possible risk factor. From a restorative point of view, the retention type of the superstructure may be associated with technical or biological complications or aesthetic failures [40]. The question of joining natural and implant abutments has also been subject to controversial discussion.

3. PATIENT SECTIONS

3.1 Patient expectations

The high number of implant treatments performed today may have deceived patients into believing that there are no longer any contraindications to implant treatment. Implants require a physiological bone metabolism, something that is not a given in the presence of several systemic diseases such as osteopetrosis (Morbus Albers-Schönberg), osteodystrophia deformans (Paget's disease of bone) or fibrous dysplasia. The bone metabolism can also be affected by medications, smoking habits or nutritional status.

3.2 Current observations

Case reports have stated that implant treatment is possible for patients with Paget's disease or fibrous dysplasia. For patients receiving antiresorptive therapy, a high incidence of complications in the form of bone necrosis has been reported after tooth extraction, surgical interventions or even as a result of sore spots. However, implant placement, possibly in conjunction with autologous grafting procedures, could produce positive outcomes in osteoporosis patients [32]. There is a need to develop specific treatment strategies for each individual patient [28].

Low level of cholecalciferol (vitamin D3) may compromise osseointegration and graft regeneration or lead to progressing peri-implantitis [6]. Patients receiving proton pump inhibitors (PPI) or serotonin reuptake inhibitors (SRI) exhibit higher rates of implant failure [16]. Conflicting results have been reported regarding the effect of glucocorticoids and NSAIDs on implant treatment outcomes [12].

3.3 Preventions of complications

- Implant placement is contraindicated in patients suffering from osteopetrosis.
- High-dosage antiresorptive therapy could result in higher rate of BRONJ [35].
- Patients who have been on antiresorptive therapy for osteoporosis need a detailed case selection with surgical techniques not requiring intensive bone remodelling [15, 35]. Extensive bone splitting, osteotome techniques or lateral sinus grafts should be avoided.
- No increased general risk for patients suffering from osteoporosis has been reported [20].
- In patients with soft bone evident in preoperative radiographs or with increased bone resorption, blood cholecalciferol levels should be checked [6].
- In patients with PPI or SRI, the duration and amount of drugs could be investigated before considering a patient for implant treatment [16].
- Patients must be informed that untreated periodontitis, uncontrolled diabetes or smoking may substantially increase the risk for biologic complications (e.g. peri-implantitis) [3, 7, 23, 33].
- In patients under long-term glucocorticoid medication at high doses, bone-metabolism parameters may have to be evaluated.
- Mild bone malformation in patients with fibrous dysplasia or Paget's disease need a strict indication for dental implants due to a lack of pertinent data.
- Depending on the surgical indication, patient may profit by an antibiotic prophylaxis for reduced (early) implant failure [13, 36, 38].

4. SURGICAL TECHNIQUES

4.1 Patient expectations

Patients increasingly request immediate fixed rehabilitation in conjunction with immediate implant placement and loading. However, postoperative morbidity should be kept as low as possible.

4.2 Current observations

High insertion torque

Immediate implant placement with immediate restoration is a scientifically proven treatment concept for rehabilitating a failing dentition [10]. Various recommendation on the determination of primary stability have been given, depending on implant designs and the surgical procedures performed, for achieving osseointegration in the context of immediate restoration [37]. A recent RCT on insertion torque showed increased failure and bone resorption rates in the mandible for high insertion torques [25]. Previous meta-analyses have shown that high insertion torques are not correlated with increased bone resorption or implant failure [4, 22].

Flapless surgery

Implant placement using 3D surgical guides is now established, and flapless surgery should reduce the postoperative discomfort. The use of surgical guides based on CBCT technology permits highly accurate implant placement [5, 8]. Compared to free-hand flapless surgery and to the raising of a flap, the outcome of guided flapless surgery was not different in terms of implant failure rates and bone resorption in the hands of experienced treatment providers [21, 41]. Nevertheless, complication such as bone perforation or displacement of the surgical guide may occur [5, 8, 30].

Soft-tissue grafting
To achieve better outcomes in the aesthetic zone, soft-tissue grafting should be considered, particularly for immediate implant placement [31]. Grafting may also be necessary in case of soft-tissue dehiscence [2].

Amount of grafting
Grafting procedures carry a certain risk of complications. The use of shorter implants could reduce the amount of grafting required, thereby potentially lowering these risks [1].

4.3 Prevention of complications

- Due to the many different implant designs and recommend preparation techniques, especially in dense bone or in the presence of a thin cortical plate, the manufacturers' recommend insertion torques should be considered.
- Patients benefit from flapless procedures if a proper indication exists in terms of the available bone supply and preoperative 3D diagnostic findings.
- Flapless procedures are subject to a specific learning curve.
- Soft-tissue grafting reduces the risk of aesthetic complications.

5. PROSTHETIC PROCEDURES

5.1 Patient expectations

Patients expect a stable prosthetic restoration that meets their aesthetic and functional needs, with minimal complications.

5.2 Current observations

A reduction in the number of implants in a given case due to economic or anatomical reasons may be considered by using both teeth and implants as abutments for fixed partial dentures (FPDs). Superstructures can be cemented or screw-retained, both of which can be associated with complications. In recent years a large spread of materials, prosthetic designs and components are used.

5.3 Tooth-to-implant fixed partial dentures

A meta-analysis of tooth-to-implant (hybrid) fixed partial dentures (T-I FPDs) reported survival rates of 94.1% after 5 years and 77.8% after 10 years of clinical service [18]. The impact of T-I FPDs and implant-to-implant FPDs in the partially edentulous arch on implant survival rates showed no significant differences for periods up to 72 months [27, 42]. A recent systematic review assessed the effect of rigid and non-rigid splinting between implants and teeth, with overall prosthetic survival rates of 85% and higher risks for tooth intrusion associated with non-rigid connections for observation periods of between 18 and 120 months [39].

5.4 Retention of superstructures

Depending on the number of implants and the design of available abutments, superstructures can be cemented or screw-retained. Technical or biological complications may occur with either type of retention. A meta-analysis showed no differences regarding loosening of superstructures, changes in marginal bone levels or peri-implantitis [19, 24]. Using 6 implants for full-arch restoration in the maxilla result in fewer complications compared to using 4 implants [34].

5.5 Design of superstructures

To minimize the number of implants, cantilevers are often used in prosthetic reconstructions. However, these superstructures are associated with a higher incidence of technical complications, particularly in full-arch reconstructions [17] and single crowns [9, 17]. Patients suffering from bruxism have also been found to experience more frequent technical complications [14].

To reduce the risk of complications such as chipping, monolithic zirconia superstructures perform better than veneered zirconia in full-arch reconstructions [26, 29]. Additionally, metal-ceramic superstructures exhibit fewer complications compared to metal-acrylic resin implant-supported fixed complete dental prostheses [11].

5.6 Prevention of complications

- Rigid superstructures should be preferred for T-I FPDs.
- Complications associated with T-I FPDs are encountered mainly at the natural abutment, especially when the teeth are periodontally compromised or root canal filled.
- The form of retention of the superstructure should be chosen by taking function, aesthetics and professional maintenance into account rather than focusing on available techniques.
- To facilitate maintenance, a retrievable superstructure is preferred, but a definitive cementing on natural tooth.
- To avoid technical complication the biomechanical considerations for each patients must be evaluated.

6. CONCLUSION

Dental implants are reliable treatment options for restoring patient function and aesthetics. Careful case selection is necessary by considering not only the oral findings alone. Due to the great variability of implant designs and surgical and prosthetic procedures proposed, the individual suggested parameter should be followed to avoid complication. All procedures should be performed by treatment providers with the requisite up-to-date expertise and training.

Cologne, 1st March 2025

Univ. Prof. Dr. Dr. Joachim E. Zöller
Vice-Präsident

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Chairman of EuCC

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