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## Prosthodontic management in provisionalization of implants in esthetic zone

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### Abstract

**Introduction:** The goal of all dental implant therapy is to maintain the esthetics, function and stability of the restoration and the peri-implant tissues involved in the provisionalization.

**Objective:** To analyze the literature on prosthodontic management of implant provisionalization in esthetic zones such as whether or not to perform immediate loading, emergency profile management, provisionalization techniques and management in esthetically compromised zones.

**Methodology:** PubMed, Scopus and Google Scholar databases were reviewed to find recent articles published on the management of the provisionalization of implants with the following keywords "dental implant", "esthetic dentistry", "emergence profile", "esthetic zone", "interim prosthesis".

**Results:** Whether or not to perform immediate loading will depend on the primary stability of the implant when it is placed and the esthetic requirements of the patient. Emergency profile management is crucial to improve the esthetic result of the final restoration in the esthetic zone and this begins with the placement of the provisional. There are several techniques for the immediate provisionalization of implants, the most popular of which is the provisionalization with a temporary crown previously fabricated in the laboratory. During the implantological intervention in the esthetic zone, the volume of the soft tissues should be maintained as well as their correct conformation around a provisional restoration, if possible.

**Conclusion:** Currently, immediate provisionalization is preferred as long as the implantological intervention allows it. The management of the emergence profile should be taken into account since the conformation of the gingival tissues will start to be established in order to obtain an optimal esthetic result in the definitive restoration.

**Keywords:** Dental implants, esthetic zone, provisionalization, emergence profile.

### 1. Introduction

The goal of all dental implant therapy is to achieve maintenance, from provisionalization, of esthetics, function, and stability of the restoration and the peri-implant tissues involved, especially when working in the esthetic zone [1]. Maintaining or creating esthetic margins around implant prostheses in the esthetic zone has always been a challenge for the clinician [1]. A successful implant restoration is one that manages to maintain the health of the peri-implant tissues, in addition to complying with the esthetic harmony of the other teeth [2]. According to the third ITI consensus the loading protocol in implant dentistry can be divided into immediate loading, early loading and late loading [3]. The advantage of immediate provisionalization is to place a fixed esthetic solution in addition to preserving the emergence profile in case of immediate implant placement [4]. Restoring the esthetic zone has always been a challenge for the operator because of the various variables, however, the immediate provisionalization protocol following implant placement has proven to be a successful treatment with satisfactory patient outcomes [5, 6]. The correct prosthodontic management for the provisionalization of implants in the esthetic zone plays a crucial role in implant treatment.

So it is of utmost importance that the clinician has the knowledge of how to achieve a favourable esthetic result in such treatment since this will determine the patient's perspective on whether the treatment was successful or not. In this work, we reviewed the literature on prosthodontic management in the provisionalization of implants in the esthetic zone such as whether or not to perform immediate loading, emergency profile management, provisionalization techniques and management in esthetically compromised areas.

## 2. Materials and Methods

Articles on the subject published through the PubMed, SCOPUS and Google Scholar databases were analyzed, with emphasis on the last 5 years. The quality of the articles was evaluated using guidelines, i.e., identification, review, choice and inclusion. The quality of the reviews was assessed using the measurement tool for evaluating systematic reviews. The search was performed using Boolean logical operators and, OR and NOT. The search was performed using Boolean logical operators and, or and not; with the keywords: "Dental implant", "esthetic dentistry", "emergence profile", and "Esthetic zone". The keywords were used individually, as well as each of them related to each other.

## 3. Results & Discussion

### 3.1 Whether or not to perform immediate loading

There are studies that have evaluated the success rate of immediate implants with immediate provisionalization in the esthetic zone, finding a 100% success rate for implants with an 18-year follow-up<sup>[7]</sup>. Immediate provisionalization is said to show successful preservation of peri-implant tissue volume in the esthetic zone<sup>[8,9]</sup>.

A study that sought to evaluate the stability of peri-implant tissues when performing immediate loading on single implants with three different implant-abutment interfaces found that at all interfaces the tissues were stable with a 5-year follow-up<sup>[10]</sup>.

Similarly, a study that sought to evaluate the degree of success of "narrow" implants when loaded immediately after placement shows that performing such a procedure is safe and predictable two years after placement<sup>[11]</sup>.

Other studies claim no significant changes in soft tissue stability comparing implants with immediate provisionalization versus implants with delayed provisionalization<sup>[12]</sup>.

However, in contrast, there is ample evidence in the literature that there is no statistically significant improvement in esthetic terms in implants with immediate provisionalization vs. delayed provisionalization<sup>[4, 13, 14]</sup> as well as another study proved that there is no significant improvement in esthetics when performing or not immediate provisionalization, more than the slight improvement in the height of the distal gingival papilla in the group of implants restored immediately, however, another study conducted in 2019 by Furze *et al.* mentions that there is an improvement in the esthetic outcome of the pink score when performing immediate provisionalization<sup>[15, 16]</sup>.

Other studies have evaluated the patient satisfaction rate when performing immediate provisionalization following implant placement, which was shown to be high, however, it was found that the criticism of the final result comes more from the operator than from the patient<sup>[17]</sup>.

Similarly, there are studies that state that patients who were rehabilitated with implant-supported crowns that received a

provisional crown prior to definitive rehabilitation have superior esthetic results in the peri-implant tissues than those who did not have provisional restoration<sup>[18]</sup>.

Whether or not to perform immediate loading will depend on the primary stability obtained by the implant when it is placed and the esthetic requirements of the patient. Immediate provisionalization of the implant will provide an optimal esthetic result, in addition to maintaining and/or contouring the emergence profile of the area to be rehabilitated.

### 3.2 Emergence profile management

The management of the emergence profile has an important bearing on the shape and health of the gingival tissues and it all lies in the proper shape of the subgingival portion of the prosthesis<sup>[8]</sup>.

There is the "biological esthetic contour concept" which encompasses several areas to take into account in the creation of an emergence profile that generates favourable esthetic results in the peri-implant tissues<sup>[19]</sup>.

In the emergence profile, we find two types of contours, the critical and the subcritical. The former will influence the gingival level and zenith location and the latter will influence the peri-implant tissue support and gingival staining. Both concepts are crucial for good emergence profile management of the implant-supported restoration<sup>[20]</sup>.

It has been found that to maintain the stability of the marginal mucosa around the restoration, a concave pattern should be used in the emergence profile to avoid gingival recession over time<sup>[2]</sup>.

There are clinical situations at the time of implant placement in which it is not possible to place an immediate provisional, so a customized healing coping can be made, in which we maintain the contour of the soft tissues to reduce the number of clinical steps to give that natural emergence appearance of the restoration to be placed later<sup>[21]</sup>.

With CAD-CAM technology it is possible to replicate the emergence profile of the contralateral tooth to be rehabilitated, making a customized provisional attachment with a copy of the emergence profile of the contralateral tooth, having good esthetic results in soft tissue management<sup>[22]</sup>.

The emergence profile management is crucial to improve the esthetic outcome of the final restoration in the esthetic zone and this starts from the placement of the provisional, which should have a fully polished critical and subcritical profile adequate to maintain stable gingival volumes.

### 3.3 Provisionalization techniques

Generally, the techniques for provisionalization in implant dentistry are divided into direct, which is performed intraorally, and indirect, a procedure performed in the laboratory with superior esthetic results<sup>[3]</sup>.

There are various techniques for provisionalizing single implants, however, due to the esthetic demands in the anterior maxilla, provisionalization is always usually immediate, varying in whether an immediate loading or delayed loading protocol is performed, the latter being carried out by bonding the provisional with composite resin to the adjacent teeth at the time of implant placement<sup>[23]</sup>. One of the techniques that have become popular is the use, if possible, of the same crown of the extracted tooth, attaching it to the provisional abutment to perform an immediate provisionalization protocol without contacts in centric occlusion or excursive movements, thus obtaining predictable esthetic results<sup>[24-26]</sup>.

There are cases where implant placement cannot be performed yet, such as in young patients who have not

completed their craniofacial development, with the absence of an upper central incisor, in which such cases have been successfully managed by placing fixed "one-wing" monolithic zirconia restorations [or in cases where implant placement has to be delayed because surgical procedures for regeneration of the peri-implant tissues have to be performed first, Maryland type provisionals are placed [3, 27].

Nowadays, fully digital management in immediate implant placement and provisionalization can be carried out using software in conjunction with digital scanning systems, obtaining predictable and esthetic results in provisionalization and definitive restoration [28].

Also, thanks to the use of a digital workflow, there is the possibility of having the provisional restoration ready before implant placement is performed, minimizing surgery time and improving esthetic results [29].

When performing a protocol for immediate implant placement and immediate provisionalization in the esthetic zone in patients with malocclusion, it is important to keep the provisional restoration away from all dental contact and to give specific instructions to the patient not to use the restoration for biting, in order to ensure the survival of the implant [30].

In cases where a surgical procedure was performed and no pressure is desired on the treated area to avoid loading problems, an Essix-type provisional can be placed, which is also indicated in patients with limited interocclusal space and deep anterior guidance; however, it is important to note that there will be no tissue modelling to generate an emergence profile [3].

There are several techniques for immediate provisionalization of implants, the most popular being provisionalization with a temporary crown previously fabricated in the laboratory, which should be free of all centric and eccentric occlusal contact to avoid interfering with proper osseointegration of the implant.

### 3.4 Management in esthetically compromised areas

The esthetic zone is frequently compromised by various situations, including a lack of the ideal soft and hard tissue volumes to have a good esthetic result, which is why in immediate implant placement, soft and hard tissue augmentation procedures are used together with immediate provisionalization with the extracted tooth crown to subsequently have the ideal volume of peri-implant tissues for placement of the definitive restoration [31]. An example of when one may be exposed to these risks is when the thickness of the vestibular table is less than 0.5 mm, where the vestibular bone is more susceptible to resorption, compromising the esthetic outcome of the implant treatment [24].

On the other hand, some studies show that there was no significant difference in esthetic results between performing or not bone grafting, however performing bone grafting would ensure more stability of the peri-implant tissues [32]. Another type of graft material that could be used in these cases is inorganic bovine bone to fill the peri-implant gap at the time of immediate implant placement, with good esthetic results [33]. The clinician may encounter dehiscences in teeth where he or she planned to remove and place the immediate implant and perform immediate provisionalization, where this procedure has been shown to be safe, however, attempts to improve esthetics such as bovine collagen placement, will not improve these parameters [34].

Immediate implant placement reduces the likelihood that access for screw-retained restorations will exit in a straight

line at an esthetically favourable site, making prosthodontic procedures more difficult [1]. Similarly, the clinician may come to notice that when provisionalizing the access is along the incisal edge of the restoration, which may esthetically compromise the results of the restoration, so instead of using a cemented restoration, a restoration with angled access can be made to take advantage of the benefits of screw-retained restorations with good esthetic results [35].

On the other hand, in cases of high esthetic demands, there are temporary attachments that could be used to improve the esthetics of the immediate provisional restoration, such as polyether ether ketone attachments, which, it should be noted, are not considered a good option for definitive prosthetic attachments due to their lack of biomechanical requirements [36].

There will be cases where there will be gingival disharmony in the esthetic zone, where the modification of the critical profile of the restoration with composite resin aggregates can be used to adjust the gingival margin to where it is desired and improve the gingival architecture [20]. Other cases of gingival disharmony could be in patients with deciduous teeth, which present discrepant gingival margins to the permanent adjacent teeth, so the correct diagnostic wax-up, placing the margins of our restoration to where we want them ideally at the time of case planning, helps the optimal final result of the implant-supported restoration [37].

Currently, there is immediate implant placement without an opening flap, which decreases surgical appointments and preserves the alveolar bone, preventing it from collapsing and thus improving esthetic results [38].

During implant surgery in the esthetic zone, soft tissue volume should be maintained as well as correct soft tissue conformation around a provisional restoration, if possible. This can be promoted by the use of grafts during implant placement and the use of prosthetic attachments that promote esthetics in the esthetic zone as well as a provisional restoration that harmonizes with the adjacent teeth.

## 4. Conclusions

### There are several aspects to take into account in the provisionalization of implants in esthetic zone

1. Currently, immediate provisionalization is preferred as long as the implantological intervention allows it.
2. The management of the emergence profile should be conscientious from this stage since the conformation of the gingival tissues will be maintained or will begin to be established in order to obtain an optimal esthetic result in the definitive restoration.
3. It is preferable to have the provisional restoration ready at the time of implant placement for immediate provisionalization, which should be free of all occlusal contact.
4. The volumes of the peri-implant tissues should be cared for and maintained with the provisional restoration to be placed, which in turn should meet the esthetic requirements that allow it to harmonize with the adjacent teeth.

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