



## Tissue Preservation in Single Tooth Immediate Implant Restauration in Aesthetics Area with Anatomical Provisional and PEEK - Based Abutment: Case Report

**Dario Tommaso Ranieri<sup>1,3,4</sup> and Marco Mirijello<sup>2,3,4\*</sup>**

<sup>1</sup>Healthcare Director, Vicenza, Italy

<sup>2</sup>Healthcare Director, Thiene, Italy

<sup>3</sup>Oral Surgeon and Implantologist, DentalPro Clinic, Thiene, Italy

<sup>4</sup>Oral Surgeon and Implantologist, DentalPro Clinic, Vicenza, Italy

**\*Corresponding Author:** Marco Mirijello, Healthcare Director, Thiene, Italy.

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### Abstract

The immediate loading of dental implants success depends on the management of the bone tissue and peri implant soft tissues. The choice of the abutment material and provisional has a key role in the management of tissues. A significant problem is the loss of peri implant soft and bone tissues. The aim of this article is to present a clinical case of a young patient with immediate implant restauration in aesthetics area with anatomical provisional and PEEK - based abutment and to offer an innovative treatment. Abutment in PEEK together with a new immediate loading provisional technique demonstrated an excellent result.

**Keywords:** Tissue Preservation; Single Tooth Immediate Implant Restauration; Aesthetics Area; PEEK

### Introduction

Soft tissue management takes a central role in the dental implantology field. Restauration of single or multiple teeth with dental implants has become a valid therapeutic solution. Moreover, there is a great necessity of immediately loaded treatment solutions in the management of partial or total edentulism.

Even though the management of different tissues in the oral cavity and the performance of dental implants in cases with conventional loading, have reached high levels of predictability, soft tissue preservation remains a great challenge in front of the clinician and is mandatory in order to reach long term stability.

Although the literature gives controversial opinions about immediate loading and cannot provide solid evidence for its successful application in the clinical practice [1], the numerous successful cases encourage clinicians to dedicate efforts in developing and improving this technique [2].

The success of immediate loaded implant depends on many factors that must be taken into consideration. The concept of Brånemark's osseointegration [3] alone is not enough to ensure the success of the implant in short and long term. Patient's selection, bone quality and quantity, implant number and design, implant primary stability, occlusal loading and clinician's surgical practical experience are crucial for the final success of the restauration.

The high primary stability of the implant (torque higher than 50N), the right position of the implant and the right selection of patients are considered one of the most important factors for the successful outcome of the intervention [4].

The management of the occlusion loading and soft tissues is a delicate step in the main process and most common reason for failure. In the time interval between the implant insertion and complete osseointegration all forces interacting on the provisional must be balanced.

Moreover, the provisional should maintain a stable soft tissue, assure full support for the papillary tissues and achieve acceptable labial/buccal contours.

Another critical point is the aesthetic result for the patient. The wrong management of the soft tissue could end into an unpleasant and not satisfying aesthetical result that could provoke various psychological and behavioral problems. That is why the provisional should resemble as much as possible the natural tooth in color, shape and anatomical position.

The provisional is usually made by resin in 24 to 48 hours after the impression is taken from the patient to perform immediate loading. Amato., *et al.* proposed a new immediate, anatomically designed, single-unit provisional [5]. Taking advantage of the patient's extracted tooth, they prepared a provisional that simulated the original shape of the tooth and improved the tissue response.

The healing process of the soft tissue could be affected by the abutment as well. Most of the abutments are made in titanium alloy. Taking into consideration the surgery technique of aesthetic area implant, the abutment angulation is often necessary to resolve the vestibular inclination of the implant. Different dental supplies firms provide to the market abutments with inclination (usually 15° or 25°) or could be produced by laboratories with the needed angulation after taking impressions from the patient.

Nowadays a new PEEK based abutment is available. The high-performance polymer PEEK (poly- ether-ether-ketone) is more often used in the field of dentistry, mainly for removable and fixed prostheses. The mechanic properties of this material could be an advantage to manage the occlusal forces as well as to diminish the implants' stress [6].

### Case Report

An 18-year-old female Caucasian patient attended at the dental clinic of Thiene (Italy), because of a tooth mobility (5.3). The physical examination showed a deciduous tooth at the place of a permanent tooth (1.3). The examined tooth presented mobility of II grade and its shape did not allow correct development of a proper canine guide on the right side. The deciduous tooth colour was significantly brighter than the rest of the teeth and created an aesthetic dental arc (Figure 1).



Figure 1: Pre-operative dental status of the patient.

Cone beam computed tomography was performed. The exam demonstrated absence of the element 1.3. Also, it confirmed the deciduous tooth roots reabsorption. During the exam, quantity and quality evaluation of the bone was performed (Figure 2).



Figure 2: Cone beam computed tomography.

Taking into consideration the agenesis of 1.3, the young age and the excellent general health status (no registered co-morbidity), the patient was scheduled for a surgical procedure. It consisted of extraction of the 5.3 and replacement of the element with an implant in position 1.3.

Simultaneously with the surgical procedure a pharmacological treatment was prescribed: Amoxicillin 875 mg + Clavulanic Acid 125 mg, 1 tablet every 12 hours starting the day before the surgery for 6 days.

During the surgery local anaesthetics, articaine (4%) with epinephrine 1:100,000 were applied. The deciduous tooth was extracted and saved in physiological saline. It was evaluated the extraction site, its depth, the marginal bone level and the presence of proper soft tissue. An adequate implant space and depth were obtained by osteotomy. We verified the right inclination with a pin and measured the bone depth to insert the implant “prosthodontically guided”. To perform the immediate loading the site of insertion was under prepared to get high primary stability. The maximum diameter of the osteotomy was 3.2 mm, 1 mm less than the diameter of the implant. A Titanium implant (Avenir) 4.2 mm of diameter and 13 mm of length and with conical shape was inserted. It was reached a high torque of 80N.

After the surgery was connected a standard Peek abutment (h. 3,5) and roughly prepared with a diamond burr within the patient’s mouth then finished outside the mouth (Figure 3).



Figure 3: PEEK abutment preparation.

The extracted tooth was emptied from the inside to create space for the abutment and removed part of its root till two millimetres deeper of amelo-cemental junction, where anatomically starts the connection with the bone.

The 5.3 was placed on the abutment and, once the right position for the occlusion was found, the acrylic addition was performed intraorally. The provisional was removed from the patient’s mouth, and the margins of each abutment/provisional interface were refined for a smooth, crisp seat on each Peek abutment. In this way was created an instantaneous provisional. It was finishing and polishing and screwed on the implant (Figure 4).



Figure 4: Immediate loading with anatomical provisional finished and polished.

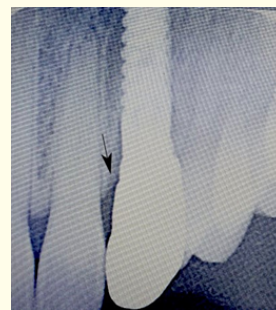
During the control visit of the end of the third month the soft tissue was fully preserved and the implant osteointegration reached. It was made a zirconia - ceramic crown (Figure 5). The crown was made from 5 - multilayer zirconia waffle (Blu Zirkon) 600/1200 MPa, the ceramic layer through MiYO® Liquid Ceramic System. Operated by R.B. Odontotecnica S.N.C. (Padova). The crown was connected to the implant through Titanium abutment. The cementation was obtained with Panavia V5. It was checked the occlusion forces, the canine guide, the movements of protrusion and laterality, and contact points. The patient was instructed for home oral hygiene. The follow up for our patient was 12 months (Figure 6). There was no sign of bleeding and probing depth was 2 mm.



Figure 5: Permanent zirconia-ceramic crown.



**Figure 6:** Follow up at 12 months after cementation of the crown.



**Figure 7:** Intraoral X-ray to evaluate the bone tissue.

### Discussion

In our clinical case the bone tissue of the patient remained preserved and the interproximal bone level remained substantial. Bone reabsorption after the cementation of the crown was not observed (Figure 7). We used PEEK abutment because of the various advantages that it offers. Its preparation is easy and immediate due to its specific characteristics. Vestibular/palatal inclination needed for correct location of the provisional is prepared directly in the mouth of the patient preparing the abutment as a natural tooth [7]. In the literature there are still controversial opinions about the soft tissue response to the PEEK abutment. Caballè-Serrano, *et al.* conducted a study to evaluate the presence of multinucleated giant cells (MNGCs) in the soft tissue after using PEEK abutment [8]. They did not observe inflammatory reaction in the soft tissues but significantly higher number of MNGCs in contact with PEEK compared to the number of MNGCs in contact with Ti closure caps. The role of MNGCs is not fully understood yet. In the past all giant cells were classified as osteoclasts because of their ability to resorb and replace bone grafts with *ex novo* formed bone tissue. In the last years, all efforts of the scientists are dedicated to understanding better the role of the MNGCs in these processes. The existence of a specific subclass of MNGCs incapable of resorbing bone tissue substitutes even years after their implantation was discovered [9].

The anatomical provisional assured a proper occlusion that resulted in a less stress on the implant and guided tissue preservation which resulted in the maintenance of interdental papilla and assured the optimal tissues healing and great aesthetic effect.

Moreover, the specific personalised shape of the anatomical provisional allowed the patient to perform an excellent oral hygiene and avoided the bacterial plaque accumulation.

### Conclusion

As Amato, *et al* demonstrated in their study from 2020 the anatomical provisional minimize the loss of soft tissue and respect the soft tissue and minimized the loss of tissue volume, resulted from post extraction bone remodeling, thus optimizing the final aesthetic result.

The PEEK abutment reduces the bone stress due to its elastic properties. Immediate loading cases could be resolved with high level of predictability. An interesting innovative approach is to use PEEK abutment for permanent crowns.

More detailed studies with longer follow up of the patients are needed to confirm the advantages of this technique in the clinical practice. Even though there is limited number of scientific publications on this matter we clearly see the potential benefits from anatomical provisional and PEEK - based abutment for the patient.

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