Chandra Andi Bawono, Custom Anatomic Healing Abutment for Single Maxillary Anterior Implant. Journal of Health and Dental Sciences.e-ISSN 2807-3126 Vol. 04 No. 02: pp. 117-126

CUSTOMIZED PEEK TEMPORARY ABUTMENT FOR SINGLE MAXILLARY ANTERIOR IMPLANT *(PEMBUATAN ABUTMENT TEMPORER BERBAHAN DASAR PEEK PADA IMPLANT TUNGGAL DI REGIO ANTERIOR RAHANG ATAS)*

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JHDS.unjani.ac.id/jite
Doi: 10.54052/jhds.

Article History
Received:15/05/2024
Accepted: 02/06/2024

ABSTRACT

The use of dental Implants in Indonesia has increased significantly. Public knowledge and demand for dental implant treatments are growing. The public's need to replace missing teeth with removable dentures or bridges gradually shifting towards dental implant. The aesthetic needs for dental implant, especially in the anterior region are highly desired by patients. However, this is often not achieved due to several factor, one of it was the non-optimal emergence profile of the implant supra structure. A deep understanding of the gingival tissues in relation to implants to achieve maximum esthetics is utmost importance. This case report presented the treatment with an implant using a PEEK temporary abutment as a custom healing abutment The use of customized temporary abutment as a healing abutment could provide an effective method to enhance esthetic and guide tissue response during the healing phase, so that the aesthetic could be achieved.

Keywords: customized temporary abutment; dental implant; emergence profile; esthetic healing abutment

ABSTRAK

Penggunaan implan gigi di Indonesia telah meningkat secara signifikan, dan pengetahuan serta permintaan masyarakat terhadap perawatan implan gigi terus berkembang. Kebutuhan masyarakat untuk mengganti gigi yang hilang dengan gigi tiruan lepasan atau jembatan secara perlahan beralih ke implan gigi. Kebutuhan estetika untuk implan gigi, terutama di regio anterior sangat diinginkan oleh pasien, namun hal ini seringkali tidak tercapai karena beberapa faktor, salah satunya adalah emergence profile dari supra struktur implan yang tidak optimal. Pemahaman mendalam tentang jaringan gingiva dalam hubungannya dengan implan gigi sangat penting untuk mendapatkan estetika yang maksimum. Pada laporan kasus ini, dipaparkan terapi implant dengan menggunakan temporary abutment yang difungsikan sebagai healing abutment. Penggunaan custom temporary abutment sebagai healing abutment dapat memberikan metode yang efektif untuk meningkatkan estetika dan memandu respon jaringan selama masa penyembuhan, sehingga estetika dapat dicapai.

***Kata kunci**: custom healing abutment; emergence profile; estetika; implan gigi*

INTRODUCTION

A dental implant is an endoseus material that placed into the jaw to support a dental prosthesis. Due to the benefit and success rate of dental implants, it considered as the treatment of choice for missing teeth.

Implant dentistry has undergone significant advancement since Branemark's pioneering dental implants in 1960s. Likewise in Indonesia, in today's modern dentistry, there's an increasing number of patients are choosing dental implants to replace missing teeth. The patients desire to achieve a successful dental implant that functionally well and also attains optimal aesthetic similar to natural teeth. The aesthetic outcomes have become crucial in

defining the success of implant restoration. Long-term studies show that single or multiple implants are highly predictable with high survival rates. However, in the anterior maxillary region, the aesthetic success of implant therapy is often as important as the implant survival rate. Several factors contribute to this success and can be objectively assessed, including the patient's healing capacity, the condition of the existing soft and hard tissues, and the quality of provisional and final restoration. Beyond these objective factors, aesthetic perception also plays a key role in achieving success. [1,7,10]

This case report presents the use of a PEEK temporary abutment to achieve optimal aesthetics in implants placed in the anterior region.

CASE REPORT

A 42-year-old female patient come with a chief complaint of missing her right central anterior maxillary teeth. Patient now has a frame partial denture that she had been used for 1 year. She wanted to change her denture with dental implant.

Intra oral examination showed the soft tissue within implant site was thick gingival biotype. From the axial view of CBCT imaging, it could be seen that the buccal-palatal bone thickness is 5.44-6.14 mm (Figure 1). In the sagittal view, the distance between the apex of the alveolar bone and the base of nasal cavity is 20.38 mm (Figure 2). The bone density was within normal limits, and the alveolar ridge forms an angle of 49.7 degrees with the occlusal plane.

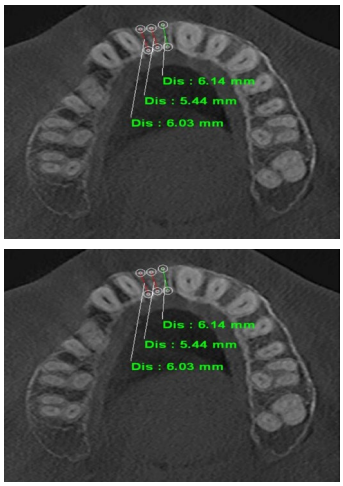

Figure 1. CBCT imaging on Axial view.

Based on intraoral examination and radiographic assessment, the patient's condition was still ideal for dental implant placement. The patient was planned to undergo a two-stage dental implant procedure. In the first stage (Figure 3), a fixture with diameter of 3.7 mm and length of 10 mm was placed (OneQ-SL Regular, Dentis Implant). In the second stage, which had been occurred 3 months after the fixture placement, the Supra structure for dental implant had been constructed.

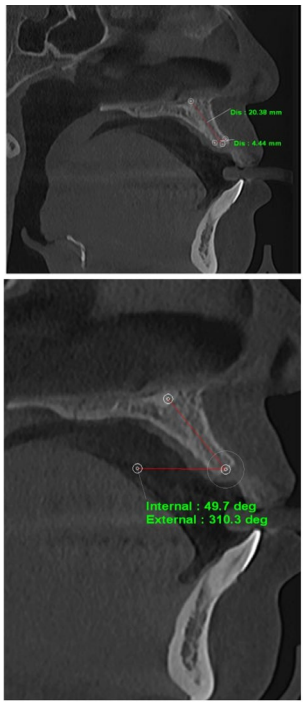

Figure 2. CBCT imaging on sagital view.

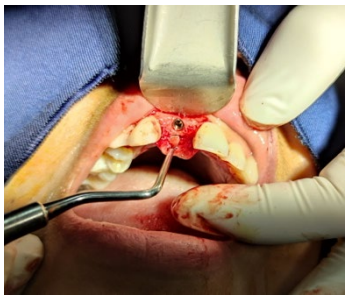

Figure 3. First stage surgery.

In the second stage surgery, a custom healing abutment had been created using a PEEK based temporary abutment (N-Hex PEEK temporary abutment, Dentis implant) (Figure 4), and built up with nanofilled composite material (Palfique LX5, Tokuyama Dental) to form an emergence profile that was suitable for the patient. The composite resin was incrementally added to customize the emergence profile specific to the site.

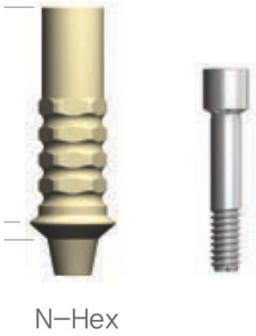

Figure 4. PEEK temporary abutment.

The shape and color of customized healing abutment was designed to match patient's intraoral condition. The creation of customized healing abutment was done on a study model, taking a consideration of the patient's gingival height, width as well as the shape and color of the patient's teeth, and then adjust it intraorally.

Figure 5. Custom healing abutment placement in patient.

Custom healing abutment was placed for 2 weeks until there was an optimal gingival tissue healing occurred (Figure 5), and the desired gingival profile was achieved (Figure 6).

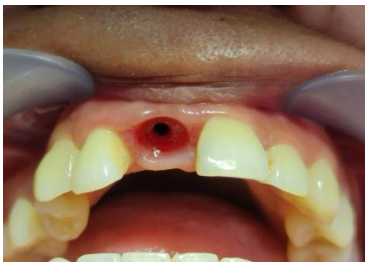

Figure 6. Gingival tissue profile.

A healthy peri-implant mucosa was very important to ensure a good emergence profile, especially in the esthetic zone. A good provisional abutment could give a well contoured gingival, an adequate interdental papilla, presence of stippling, and no inflammation.

After all of the desired mucosa has been achieved, the final impression would be taken. The final impression has been taken using a pick up impression coping with elastomeric impression materials, putty and light body. Before taking the impression, the pick-up impression coping was given composite material to ensure that the final impression reflects the optimal gingival profile and allows for well-fitting final restoration (Figure 7).

Figure 7. Pick-up impression coping with composite resin.

A zirconia implant crown with a cemented design using titanium abutment (Dentis Implant) was fabricated as the final restoration. After try-in, the crown was cemented using translucent resin cement (Relyx U200 Self Adhesive resin cement, 3M) (Figure 8).

Figure 8. Cementation of final restoration.

DISCUSSION

Dental implant treatment on aesthetic zone present specific challenges, especially in achieving optimal aesthetic. The condition of the remaining alveolar bone, the available bone for implant, and the gingival biotype, and off course the implant position are critical factors in determining the achievable aesthetic outcome.[1,8] The thick biotype is an ideal feature of gingival that will beneficially influence the esthetic result of dental implant.[2]

An aesthetic implant-supported restoration, emerging through the surrounding tissue to appear natural, requires a seamless transition from the circumferential implant fixture head to the correct cervical tooth anatomy. The abutment emergence, if designed properly,

will be structured harmoniously to support the free gingival margin and interdental papilla while providing sufficient space for the biological width.[3]

The emergence profile of the implant is a crucial factor in determining the aesthetic success of the implant restoration. In conventional method, a standard healing abutment is usually connected to the implant fixture during the second stage surgery. Based on the round circular shape of standard healing abutment, makes it more unpredictable in molding the tissue contours similar to that of natural teeth, the result is a round, unnatural-looking soft tissue profile, hence the used of customized healing abutment could be the solution to achieve the natural looking emergence profile.[4, 11,15]

Considering the dimension, the customized healing abutments had a larger size than prefabricated healing abutments. The smaller design of prefabricated healing abutments makes them incapable for supporting peri-implant soft tissue architecture and mimicking a natural profile adequatelely.[12]

An implant healing abutment serves two roles in dental implant treatment. The first is to promote healing process of peri-implant soft and hard tissues during the healing phase, including the initiation of soft-tissue contouring. The second is to protect the implant site during the healing stage from accumulation of plaque and debris.[4] Despite the advantages of customized healing abutment, some clinician may find the fabrication is difficult and time consuming.[13]

Customized healing abutment can be fabricated from various material commonly used in dentistry.[4] The first is PEEK (Polyetheretherketone)**.** PEEK is a synthetic, tooth colored thermoplastic polymer which belongs to the PEAK (Polyaryletherketone) family. PEEK gained popularity in dentistry as a substitution material in patients allergic to metal. PEEK can combine with composite resin as veneering material. PEEK abutment does not have sufficient biomechanical requirements to replace the definitive titanium abutment, but it considered ad an alternative material. PEEK as temporary abutment can be a good choice especially in the anterior region where the lower masticatory forces exist.[4,6] An in vitro study demonstrated that PEEK induces fibroblast adhesion, proliferation and viability due to overexpression of biological mediation that increases cell contractility and adhesion (integrin), and enhance of the synthesis of connective tissue matrix proteins.[14]

The second is PMMA (Polymethyl methacrylate). PMMA is the most commonly used polymer in dentistry. Heat cured PMMA and CAD/CAM PMMA can be used as a customized healing abutment

for socket closure following immediate and delayed implant placement.[4]

The third is zirconia. Zirconia is a crystalline dioxide of zirconium which provides optimum properties in dentistry, including superior toughness, strength, fatigue resistance, excellent wear properties, and biocompatibility. Although zirconia provides several good properties, zirconia for customized healing abutments might not be popular because of its higher cost compared to other materials.[4]

Fourth is composite resin. Composite resin is one of the most commonly used dental materials for direct restoration. When composite resin bonds with other material, the cured composite provides a clear three-dimensional representation of the periimplant soft-tissue profile, facilitating an accurate transfer to the technical laboratory.[4]

And last is Titanium. Titanium is generally used in implant treatments. Customized healing abutments from titanium require the use of CAD/CAM.[4]

This case used a PEEK temporary abutment material due to several advantages. First, in terms of aesthetics, its color closely resembles the white color of natural teeth. Second, its good bond with composite material allows for easy shaping the temporary healing abutment as desired. This benefit can help to achieve optimal implant aesthetics in the anterior region.

CONCLUSION

Achieving a successful esthetic outcome for implant-supported restoration involves not only the surgical phase but also the crucial prosthetic phase. Prosthetic considerations include design of implant restoration, and the management of peri implant soft tissues.[9]

PEEK-based temporary abutment that used as a custom healing abutment is the solution for shaping the desired emergence profile of the implant, supporting both optimal and aesthetic implant restoration, especially for anterior implant placement.

CONFLICT OF INTEREST

The authors declare no potential conflicts of interest.

ACKNOWLEDGEMENT

The author would like to express the sincere gratitude to the patient for being so cooperative along the treatment.

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