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Optimizing Aesthetic Outcome of Anterior Implant with Provisional Restoration

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ABSTRACT

The replacement of missing teeth in the esthetic zone presents a significant challenge for dentists. Among the available treatment options such as fixed bridges and removable dentures implant-supported tooth replacement for a single edentulous site is often the preferred approach. To replicate the natural tooth contour in the cervical area, implant restoration requires a provisional restoration that serves as a tissue former, helping to mimic the shape of a natural tooth. Compared to stock healing abutments, this customized tissue former offers a distinct advantage in achieving optimal soft tissue contouring. In this case, a 40-year-old female patient complained about her right upper lateral incisor tooth (Tooth 12 is fractured). Anamnesis, along with extra- and intra-oral examinations, is conducted to assess the patient's condition. Additionally, 3D radiography is performed to evaluate the implant site and develop an appropriate treatment plan. To achieve a more ideal emergence profile and soft tissue contour, implant placement with a provisional resin restoration was chosen as the preferred approach. In conclusion, recognizing and managing peri-implant tissue is the key to long-term esthetic success. The use of provisional resin restoration is maintaining and preserving more bone and soft tissue in the implant area. The patient feels satisfied aesthetically and comfortable with the final restoration.

Keywords: Anterior, Implant, Aesthetic, Provisional Restoration

ABSTRAK

Penggantian gigi yang hilang pada zona estetik masih menjadi tantangan bagi dokter gigi. Penggantian gigi dengan dukungan implan pada satu lokasi edentulous merupakan salah satu pilihan perawatan selain jembatan cekat atau gigi tiruan lepasan. Untuk mereplikasi kontur gigi asli di daerah serviks, diperlukan restorasi implan sementara yang berfungsi untuk membentuk jaringan yang menyerupai gigi asli. Pembentuk jaringan yang disesuaikan ini lebih unggul dibandingkan dengan healing abutment pabrik. Seorang pasien wanita berusia 40 tahun mengeluh tentang gigi seri lateral kanan atas(gigi 12 patah). Anamnesis,pemeriksaan ekstra dan intra oral, Radiografi 3D dilakukan untuk mengevaluasi lokasi implan dan rencana perawatan. Penempatan implan dengan restorasi resin sementara dipilih untuk mendapatkan profil dan kontur jaringan lunak yang lebih ideal. Kesimpulan: Mengenali dan mengelola jaringan peri-implan adalah kunci keberhasilan estetika jangka panjang. Penggunaan restorasi resin sementara bertujuan untuk mempertahankan lebih banyak tulang dan jaringan lunak di area implan. Pasien merasa puas secara estetika dan nyaman dengan restorasi akhir.

Kata kunci: Anterior, Implan, Estetik, Restorasi Sementara

1. Introduction

Patients with a single missing tooth can be treated using various options, such as removable partial dentures, resin-bonded fixed partial dentures (RBFPDs), tooth-supported fixed partial dentures (FPDs), and implant-retained crowns (IRCs).[1,2] Among these, a removable partial denture is often considered one of the most cost-effective solutions. However, patients frequently express dissatisfaction with this alternative due to its nature of design and the fact that it is not permanently affixed.[3] The most common treatment choice is the fixed bridge, but this approach is highly conservative as it requires the preparation of adjacent abutment teeth.[4]

An alternative to fixed bridges and removable dentures is the placement of an IRC for single-tooth replacement, which offers functional and esthetic benefits.[1,5,6] The replacement of an individual tooth through the use of an implant is a recognized and effective treatment option. According to two systematic reviews, the survival rates of IRCs were reported to be 94.5% after five years and 89.4% after 10 years.[7,8] Misch evaluated the effectiveness of various treatment options for a single missing tooth and concluded that IRCs demonstrated the highest survival rates among the available treatment modalities.[1]

The restoration of maxillary anterior teeth using implants can pose significant challenges for dental professionals. This is primarily due to the high aesthetic expectations and the fact that the maxillary anterior ridge often exhibits limited facial bone thickness.[4,5,9–15] To imitate the natural tooth contour in the cervical area, implant restoration will need provisional which acts as tissue former to mimic the natural tooth.[9,16]

Provisional restorations play a crucial and often complex role in the management of anterior implants. The professionalization of the anterior implant site can be achieved through various methods, including either a removable (removable partial acrylic dentures, essix appliance), or fixed (fixed tooth supported archwire supported pontic, resin bonded pontic, resin bonded, cast metal framework bridge); or an implant-supported prostheses.[9,17]

Provisionalization using a removable partial denture has the potential to place undesirable pressure on the healing site. A fixed tooth-supported provisional restoration addresses this issue but still does not provide for emergence profile and soft tissue maturation.[9] Provisional restorations must ensure both functional stability and esthetic appeal, serving as an interim solution until the definitive restoration is placed. They serve to prevent the movement of adjacent teeth and the over-eruption of opposing teeth. Additionally, provisional restorations help to create an optimal emergence profile with maximum tissue volume, safeguarding the mid-facial gingiva and improving patient comfort and acceptance. This also serves as a framework for designing a visually pleasing definitive restoration that promotes effective oral hygiene.[6,16–18]

Effective implant treatment for the replacement of lost teeth in the anterior maxilla necessitates meticulous preoperative planning and a specific surgical strategy. Additionally, careful management of a provisional restoration plays a crucial role in shaping the peri-implant soft tissue, thereby facilitating the replication of an appropriate dental emergence profile.[10,14,19] The purpose of this clinical report is to describe the technique and clinical steps necessary to optimize the aesthetic result of the anterior implant with provisional restoration while safely and predictably contouring the peri implant soft tissue necessary for fabricating an ideal definitive restoration.

2. Case Report

A 40-year-old female patient presented to the private clinic with symptoms of a fractured upper. A thorough extraoral, intraoral, and radiographic examination found fractured 12 (Figure 1), overjet 1mm, overbite 2mm, and thin biotype gingiva. The patient's periodontal health was good, and a thorough clinical examination was carried followed by a 3D radiographic. Several prosthetic treatment options were given to select from, and after reviewing the benefits and drawbacks of each procedure, the patient gave consent for dental implants as a treatment modality.

Figure 1. Pre-operative condition, fracture on 12

An atraumatic extraction of tooth 12 was performed, followed by ridge preservation to maintain bone and soft tissue integrity. Before undergoing the implant procedure, Orthodontic treatment using Invisalign for gaining space mesial-distal and better overjet overbite was planned. After orthodontic treatment was performed, implant placement was planned, and both arches were scanned using a 3D scanner (trios).(figure 2). A surgical guide was made in the lab and temporary restoration using the Maryland bridge was made (figure 4).

Figure 2.Condition after healing of tooth extraction and orthodontic treatment

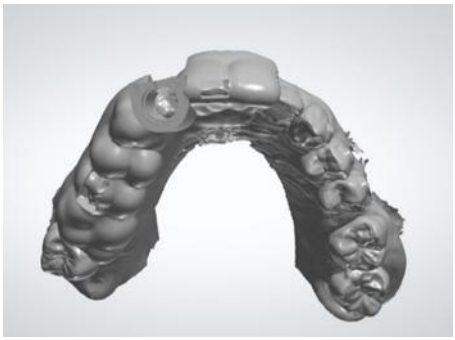

Figure 3. A surgical guide was planned by digital

Figure 4. Design of temporary restoration using Maryland bridge

After four months of the healing period of tooth extraction, under sterile conditions, the procedure of implant placement was carried out (Fig 5). Implant straumann blt 3.3mm, height 10 mm was used. An intraoral periapical radiograph (IOPA) was taken after implant placement (Fig 6) and temporary using Maryland was placed (Fig 7). Maryland was made not to contact underlying gingiva as shown in 12.

Figure.5.Implant placement 12

Figure 6.Radiograph of implant 12

Figure 7. Maryland Bridge was placed as a temporary provisional

Second-stage surgery was carried out after four months, in which the cover screw was replaced with a healing abutment H 3.5 mm, Diameter 3.6 m. Then, the tooth was scanned making the provisional resin restoration using screw-retained provisional.

Screw retained provisional restorations were fabricated with CAD-CAM in acrylic resin (Yucera) up and temporary abutments (NC Temporary Abutment, Geomedi) screwed to place in the working model. An ideal emergence profile was developed in the provisional screw-retained restorations which were placed in the patient to finalize the surrounding soft tissue healing (Figure 8). The provisional restorations were torque to 15 Ncm and the screw channels filled with cotton and teflon tape and sealed with flowable resin. Centric and lateral occlusal contacts were eliminated to minimize non-axial loading, and oral hygiene instructions were given to the patient.

Figure 8. Screw-retained provisional restorations: 3-week post placement, screw-retained provisional restorations inserted to finalize surrounding soft tissue healing

After three weeks of placement of the provisional resin restoration, the stability of the soft tissue was determined (Figure 8) and the fabrication of the definitive restorations was initiated. The implant impression procedure was carried out using a 3D scanner (Trios), and the final restoration was designed in the lab.

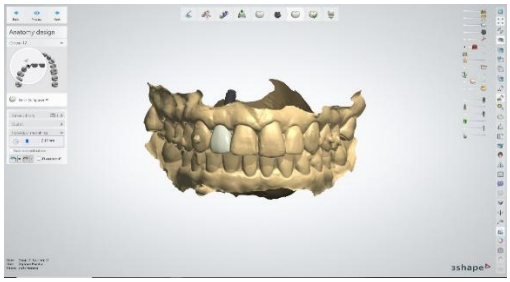

Figure 9. Designing final restoration with CAD-CAM

The definitive restorations (Figures 10 and 11) were torque according to the manufacturer's instruction and the screw channels were filled with Teflon tape and composite resin (Z250, 3M ESPE). Oral hygiene instructions were given and the patient was placed on a three-month recall control.

Figure 10.Final restoration

3. Discussion

Implant treatment in the maxillary anterior area has become an important focus in implant dentistry. Nowadays, dentists place greater emphasis on peri-implant soft tissue management and achieving a natural appearance in the final restoration. Achieving harmony between the dentition and surrounding soft tissue is crucial for optimal esthetic outcomes.[9,16,20] Studies have shown that single-tooth implants demonstrate higher survival rates compared to other tooth replacement options. Furthermore, the treatment of dental implants in the esthetic region is well-documented in the literature, with clinical trials indicating survival and success rates comparable to those observed in other areas of the jaw.[20]

The initial Brånemark protocol for the placement of dental implants necessitated a two-stage surgical procedure. This included a submerged healing phase lasting a minimum of three months for the mandible and six months for the maxilla. This approach was designed to facilitate osseointegration of the implant while protecting it from external trauma.[21]

Conventional loading protocols are recognized as predictable and widely accepted treatment modalities when compared to other loading protocols. The clinical condition and the quality ofavailable bone are crucial for achieving favorable treatment results. In contrast, a two-stage protocol should be implemented to facilitate the uneventful healing of the grafted site, free from pressure exerted by the provisional restoration. In the anterior maxillary region, the option for delayed implant placement offers the benefit of enhanced bone quality, as implants are inserted after complete bone healing. This approach allows for the precise positioning of drills, resulting in ideal or nearly ideal angulation of the implants necessary for successful prosthetic restoration.[14]

Provisional restorations are created to assess aesthetic, phonetic, and occlusal functions, as well as to preserve or restore the architecture of hard and soft tissues surrounding the implant. This process is

essential for preparing the site for a definitive restoration, ultimately aiming to achieve optimal long-term outcomes.[6,14,17,19]

The emergence profile is characterized by two contours: 1) The critical contour, situated 1mm beneath the gingival margin, where any alterations will affect the marginal level. 2) The subcritical contour, located below the critical contour, should exhibit a concave shape to ensure adequate soft tissue volume.[19] The existence of appropriate hard and soft tissue contours is important for the successful placement of implants and achieving an emergence profile that aligns harmoniously with the neighboring dentition. From a surgical perspective, the primary esthetic goals of implant therapy include achieving a harmonious gingival color, contour, and margin while maintaining a smooth transition in tissue height. Ensuring adequate papillary fill in the interproximal areas is essential for a natural and visually appealing outcome. Additionally, the color, shape, and proportion of the implant restoration should be visually appealing and satisfactory to the patient.[3]

Adjustments to the critical and subcritical contours of the restorative emergence profile are important for enhancing the architecture of peri-implant soft tissues. A variety of materials is presently accessible for creating provisional implant restorations, such as those based on polymethylmethacrylate (PMMA) and bis-acryl. In recent years, the introduction of computer- aided design and computer-aided manufacturing (CAD-CAM) technology has revolutionized the production of implant restorations, allowing for the design of provisional restorations through computer software and their subsequent fabrication through milling or 3D printing techniques.[22] In this case, two types of provisional were used, the first is the Maryland bridge, and the second is screw-retained implant temporary. Azizi et al. in a study found that an adhesive Maryland bridge can protect non-submerged post-extractive implants, prevent bone loss around the implants, and help preserve the 3D architecture of the crystal bone ridge.[23] Screw-retained provisional restorations would eliminate the possibility of having any temporary cement present in the peri-implant tissue.[17] This will establish a natural and aesthetic soft tissue form that will help the laboratory fabrication with an anatomically appropriate soft tissue model.[17] Both the provisional were made by CAD-CAM system, and allowed for optimal fit and minimal need for manual adjustment which could reduce treatment time and enhance patient satisfaction with the provisional.

In this case, both the height of the papilla and the contour of the gingival margin showed considerable stability when compared to the baseline measurements. This observed stability of the soft tissue margin may be attributed to the successful prevention of any collapse of the peri-implant mucosal tissues, thereby facilitating optimal aesthetic results.

4. Conclusion

In conclusion, the effective recognition and management of peri-implant tissue are essential for achieving long-term aesthetic success. The application of provisional resin restorations plays a crucial role in preserving and maintaining both bone and soft tissue in the implant region. Consequently, patients experience enhanced aesthetic satisfaction and comfort with the final restoration.

5. Acknowledgements

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6. Conflict Of Interest

The authors declare no conflicts of interest

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