

JOURNAL OF

Clinical Prosthodontics and Implantology (J-CPI)

Essix appliance guided implant support fixed partial denture-a case report

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Keywords

Essix appliance, Implant provisionals, Implant supported FPD, Implant esthetics, Pink esthetics

Abstract

The use of dental implants in the anterior region is a challenging endeavor. Placement of an implant in an ideal position is often not possible because of lack of sufficient bone. The restoration of the extracted anterior teeth and maintenance of the surrounding soft tissue by means of adequate surgical and prosthetic techniques are demanding for clinicians. In this case report, the Essix appliance was used as a provisional restoration post-implant placement, which was later utilized for the fabrication of an implant-supported FPD by incorporating its external form by lab scanning in order to obtain a better emergence profile and aesthetic results. The aim of this article is to report the laboratory and clinical steps involved in the restoration of anterior teeth with implant-supported FPD which was guided by an Essix appliance provided as a provisional prosthesis.

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Article Info

Received: 15 January 2026, received in revised form: 20 February 2026, accepted: 15 March 2026, available online: 28 April 2026; Volume: 8; Issue: 1; Pages: 52-58.

How to cite this article: Leoney. A, Gunaprabha. A, Abhinaya Bollepalli, Hemapriya. N., Essix appliance guided implant support fixed partial denture-a case report. J Clin Prosth Impl 2026; 8(1): 52-58.

<https://doi.org/10.55995/j-cpi.2026005>

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Introduction

The use of implants for the restoration of missing anterior teeth has been established and documented for more than three decades. Implant restoration is demanding for the prosthodontist as it involves not only surgical component but also prosthodontic component. The placement of an implant in a prosthetically ideal position involves meticulous preoperative planning. A prosthodontically driven aesthetic result has to be achieved keeping in mind

biological and function requirements of the patient.

After the implant placement and optimum management of soft tissue, the use of fixed provisional restorations like fibre reinforced composite restorations, minimally prepared resin bonded metal restorations, and removable provisional restorations, namely pressure-formed suck-down splints as well as Essix appliances, removable partial dentures contribute to the maintenance of edentulous space esthetics

and function.

Provisional restorations could also be implant supported especially when immediate loading is planned. Provisional restorations are used till the definitive implant-supported prosthesis is delivered to the patient^{1,2}

They also provide stabilization and also may act as a reference in designing the definitive prosthesis. Selection between different interim prostheses depends on several factors, namely duration of provisional usage, interocclusal space, ease of fabrication and modification, ease of removal, aesthetic demands, and economic considerations.³ Provisional restorations have several advantages namely as a diagnostic tool to evaluate peri-implant soft tissue as well as adjacent teeth and evaluation of the patient's oral hygiene.^{4,5} They also are helpful for patient management, communication between patient, prosthodontist, and technician, determination of implant site, healing of the soft tissue around the implants, improving tissue contours

related to emergence profile, and developing of an interdental or inter-implant papilla which could avoid a potential third surgical procedure. The aim of this article is to describe the use of provisional restoration namely the Essix appliance in the guidance of anterior teeth restoration with implant-supported FPD.

Case presentation

A 71-year-old male patient reported to the clinic for replacement of missing teeth. Medical history revealed that he was a known diabetic under medication and had a unilateral absence of a kidney. On intraoral examination, the patient had multiple missing maxillary anterior teeth, including root stumps, with hypermobile mandibular anterior teeth and severe gingival recession (Fig. 1). Patient's consent was obtained before taking photographs and was informed about the possibility of usage of intraoral photographs for publication and education purposes.



Figure 1: Preoperative photograph

The patient was informed about various treatment protocols, namely removable partial denture, fixed partial denture, and implant-supported fixed partial denture. The patient accepted the implant-supported fixed partial denture, and hence the patient was advised to have blood investigations as well as a CBCT. Blood parameters such as HbA1c, urea creatinine, bleeding time and clotting time were checked. HbA1c was 6.9 revealing good control of blood sugar levels. All other blood parameters were well within normal

range.

Radiographic examination

CBCT reveals bone loss in relation to maxillary and mandibular anterior teeth but adequate presence of bone for placement of maxillary and mandibular implants (Fig. 2). Based on the CBCT image analysis, it was decided to place the implant immediately after extraction of mobile teeth. The implant surgical procedure was done in 2 phases.

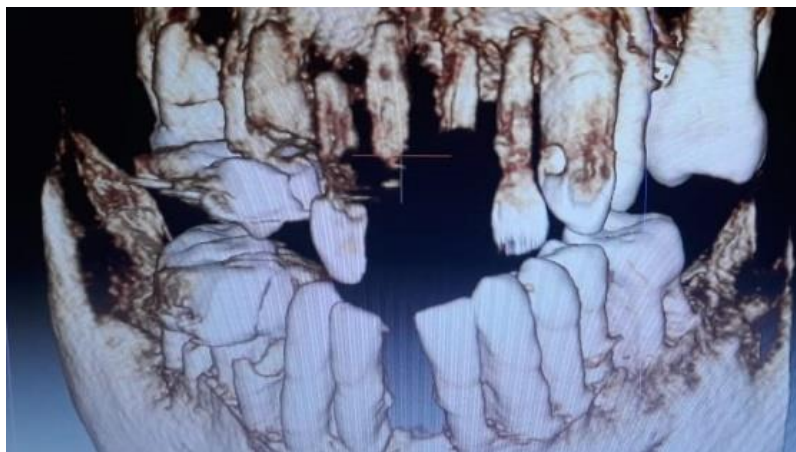


Figure 2: CBCT image

Treatment planning

The treatment includes 2 phases. In Phase 1 the implant is placed in the maxillary anterior region immediately after extraction of 13, 11, and 22 (Noris Medical Dental Implant, Hataasia Street, Nesher, Israel). Phase 1 surgery was on the mandibular region immediately after extraction of 32, 42, and 43 (Noris Medical Dental Implant, Hataasia Street, Nesher, Israel) with the help of CBCT as well as diagnostic mounting of pre-existing casts. The implants were covered with the corresponding cover screws and the flap was sutured.

Preparation of Essix appliance:

When the patient was informed about the types of provisional restorations and need for it during the healing time, the patient opted for an Essix appliance replacing missing teeth owing to the ease of maintenance of oral hygiene as well as better retention and esthetic results when compared to conventional removable partial denture. The conventional removable partial denture was not advised as it may affect the tissue healing in the implant site. With the help of the impression taken prior to extraction, the Essix appliance replacing the missing teeth was provided immediately after implant placement for aesthetic concern. The Essix appliance served as a temporary restoration while

the implant integrated. The process of fabrication of Essix involved creating a clear, thermoplastic Essix appliance with acrylic pontics.^{6, 7, 8}

It is a removable, clear plastic shell that covers the adjacent teeth, effectively bridging the gap where a tooth was lost.

Procedure:

1. Impression: Maxillary and mandibular partially edentulous impressions were made.
2. Teeth setting: Teeth were knocked out on the cast in relation to 13, 11, and 12 in the maxillary arch and 32, 42, and 43 in the mandibular arch. Teeth setting was done in relation to knocked-out teeth .
3. Fabrication: An Essix appliance was custom-made from a 0.030-inch clear thermoplastic material, conforming to the shape of the teeth and the missing tooth's space.
4. Provisional teeth: A tooth-coloured acrylic resin was bonded to the appliance, creating a temporary replacement for the missing tooth.
5. Usage: The Essix appliance provided temporary tooth replacement, protection, and healing after extractions/implant placement. The patient was instructed to wear the appliance regularly except during the night (Fig. 3).



Figure 3: Essix appliance delivered

Phase II: Prosthetic phase

The patient was examined at weekly recalls during the provisionalization phase which lasted for 4 months. The implant uncovering procedure was accomplished, and healing abutments were placed for a period of 3 weeks in order to create a gingival cuff for a better emergence profile.

Construction of final restoration:

After 4 months of healing, cover screws were uncovered for stage 2 surgery and prosthetic rehabilitation. Implant stability quotients are checked by means of measuring rod of Implant stability tester (Dental plant, Gurugram, Haryana) placed on the implant fixture. A ISQ value of greater and equal to 50 indicates better implant stability and candidate for implant loading. Healing abutments of 5 mm length and 5 mm diameter were used to create an adequate

emergence profile in relation to the 6 implants. Implant abutments were tried to determine whether any angulated abutments would be required. Impression procedures were done using an open tray impression technique using silicone impression material (Zhermack, Badia Polesine, Italy). In the laboratory phase, implant analogues were placed on the impression and casts were poured. To get an appropriate emergence profile, silicone soft cast material was poured around the implant. It was decided to use angulated abutments of 15 degrees for maxillary implants and straight abutments for mandibular implants in order to achieve adequate aesthetics (Fig. 4). The prosthesis was designed in the laboratory using EXOCAD software (Fig. 5). The Essix appliance was used for the fabrication of a definitive prosthesis by extraoral scanning of the Essix appliance and incorporating it into the prosthesis design.



Figure 4: Implant abutments tried on the patient

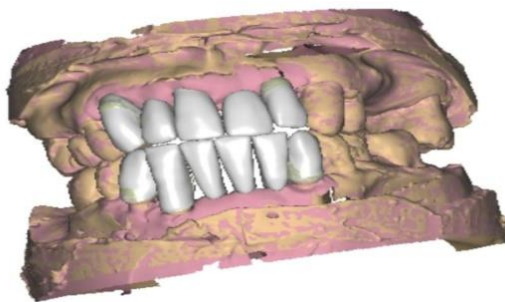


Figure 5: Definitive prosthesis designed by EXOCAD

The abutments were tightened to the implant fixture with hex driver and torque wrench (Noris Medical Dental Implant Solutions, Hataasia Street, Nesher, Israel). Tightening torque of 25 Ncm was used for tightening of abutments. Prostheses were made with layered zirconia with gingival pink ceramic. The definite maxillary prosthesis was a cement-retained Zirconia FPD with 13, 11, and 22 implants as abutments, and the mandibular prosthesis was cement-retained Zirconia FPD with 43, 42, and 32 implants as abutments (Fig. 6). The prosthesis was milled by DG

Shape DWX52 D, Japan. The patient was followed up at 6 months, 12 months, and 24 months. The patient was found to be well adapted to the implant supported prosthesis and on clinical /radiographic examination there were no signs of mobility, inflammation, pain, or excessive marginal bone loss. PES/WES score for maxillary implant supported FPD was 18 which indicated exceptional clinical outcome. But mandibular implant supported FPD exhibited a PES/WES score of 12 only which denotes mere acceptable level of clinical/esthetic acceptability.



Figure 6: Implant supported prosthesis cemented

Discussion

The restoration of anterior maxillary implants often requires soft tissue management around the implant in order to enhance the aesthetic outcome. Prosthetically driven implant placement facilitates the integration and restoration in relation to adjacent teeth. The implants immediately after extraction prevent resorption of alveolar bone with adequate soft tissue coverage over the extracted socket. Anterior tooth loss often compromises ideal bone volume in the aesthetic region, as explained by Eswaran et al.³ They have explained that patient had good esthetics and comfort with the usage of Essix appliance retained tooth pontic. Essix appliance was

prescribed to the patient so as not to disturb the soft tissue around the osteotomy site of implant.

Provisional restorations by means of vacuum formed retainers otherwise called Essix retainers are relatively easier to fabricate. Wang et al.⁶ have described that they have a disadvantage that they cannot be used as long term provisionals as they interfere with mastication and speech. They have also noted that usage of Acrylic resin based removable partial dentures as implant provisionals had the disadvantage of bulkiness, palatal coverage, and possibility of causing inflammation on the implant site due to exertion of pressure.

Srivastava et al.[7] have noted that the usage of Essix retainer as provisional over an anterior implant site after socket shield technique exhibited superior esthetics and comfort. The Essix retainer was used by them both as surgical guide and provisional restoration.

In the present case, the pontic attached to the Essix appliance helped in maintaining the soft tissue contour in the implant surgical site. Plaque retention was seen during periodic visits. Good oral hygiene instructions were emphasised as plaque retention was found near the gingival regions of the teeth. A better emergence profile can thus be achieved. The scanned image of the Essix appliance aided in the fabrication of the final prosthesis contour, as it transfers the patient's aesthetic demands.

Provisional restorations are vital in restoring anterior maxillary and mandibular implants during the osseointegration phase.[4, 5 Poggio et al.[4] have described the technique of utilizing a mesh veneer plate retained polycarbonate crown provisional for replacement of single tooth pontic after implant placement. The provisional restoration was bonded on to the tooth structure by means of autopolymerizing bonding agent and composite. The fixed provisional described by them is economical and is esthetically and functionally superior when compared to removable provisionals. The disadvantage with their technique could be the durability in long span edentulous spaces as in the present clinical case.

A fixed removable type of provisional restoration over an implanted site has been described by Antony et al.[8] taking support from adjacent prepared tooth and unprepared tooth. They have described this provisional to be more comfortable to the patient as the patient is able to perform mastication and speech. In this clinical case, patient was not inclined to involve adjacent teeth. Hence, decision was made to give an Essix retainer.

Sendhilnathan D et al. 9 have described an immediate temporary fixed provisional with a labial screw access. But in the present clinical case, immediate fixed provisionals

were not given due to the fact that patient is diabetic and adequate healing is a pre-requisite for osseointegration.

Clinical learning tips

Firstly, from this case report we could understand that prosthetically driven implant placement ensures functional and aesthetic success particularly in situations like the anterior teeth replacement. Secondly, provisional restoration like ESSIX plays a pivotal role in not only restoring esthetics but also plays a protective role over and around the osteotomy site during the osseointegration phase. Thirdly esthetics achieved and approved via ESSIX appliance can be transferred to final prosthesis digitally which makes the treatment by dental implants more predictable and successful. Finally, ESSIX appliance offers a simple, economic as well as easily maintainable alternative to other implant provisional restorations because of ease of removal for oral hygiene, along with functioning as a space maintainer throughout the osseointegration period.

Limitations

The Essix appliance has a disadvantage that it is not durable and not to be used as extended provisional restoration. Essix appliance also tends to accumulate plaque and patient found it difficult to keep it clean and hygienic.

Conclusion

Dental implants have become a popular treatment modality for replacing missing teeth. Aesthetic concerns, especially in the anterior region of the maxilla, should also be considered until the definitive restoration is delivered. Another indication for such restorations is maintenance of the space required for aesthetic and functional definitive restorations in cases where the implant site is surrounded by natural teeth. From the case report we could find that the use of provisional restoration, like the Essix appliance, in the guidance of anterior teeth restoration with implant-supported FPD yields the finest outcomes, aesthetically as well as functionally.

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