



Case Report

Pontic-filled essix retainer as a temporary esthetic solution during clear aligner therapy: A case report

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Abstract

Background: Temporary tooth replacement before initiation of orthodontic clear aligner therapy can be a challenge, particularly when esthetics in the anterior region are a priority. Traditional solutions such as removable partial dentures, bonded pontics, and Maryland bridges have limitations related to cost, invasiveness, and comfort. The integration of a pontic within an Essix retainer represents an innovative, minimally invasive, and esthetic alternative.

Case Presentation: A 28-year-old male presented with a retained deciduous mandibular incisor associated with mobility and discomfort. The treatment plan involved extraction prior to commencement of clear aligner therapy. To prevent the resulting esthetic and functional deficit during the waiting period for aligner fabrication, a pontic-filled Essix retainer was designed. Digital intraoral scans were segmented using 3D Maestro software, followed by virtual extraction of the deciduous tooth and pontic design. A 3D-printed model was generated, and a 1 mm Essix retainer was vacuum-formed. The pontic space was filled with tooth-colored composite resin, producing an immediate esthetic replacement. The patient reported excellent comfort, speech function, and satisfaction.

Results: The pontic-filled Essix retainer preserved esthetics, maintained space, and allowed seamless integration into the planned aligner therapy. No complications occurred during interim use, and the patient adapted well prior to receiving aligners.

Conclusion: A pontic-filled Essix retainer is a simple, cost-effective, and patient-friendly temporary solution for anterior tooth replacement before aligner therapy. This case highlights its advantages compared with conventional alternatives, while recognizing the need for further research on long-term durability and material optimization.

Keywords: Pontic, Essix retainer, Clear aligner therapy

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1. Introduction

Esthetic management during orthodontic treatment is often as important as functional correction, particularly in adult patients seeking clear aligner therapy. The loss or extraction of anterior teeth prior to orthodontic intervention presents a significant clinical dilemma. For patients awaiting aligner fabrication, even a short edentulous period can compromise appearance, psychosocial confidence, and compliance. Conventional temporary replacement strategies including removable partial dentures (RPDs), flipper appliances, resin-bonded pontics, and Maryland bridges each present limitations such as bulkiness, discomfort, impaired speech, risk of debonding, and interference with orthodontic mechanics.¹⁻³

The introduction of Essix retainers has provided orthodontists with a versatile, esthetic, and minimally invasive method for space maintenance. Essix retainers are widely utilized at the end of orthodontic treatment; however, their application as an interim esthetic prosthesis has been relatively underreported. More recently, the possibility of incorporating pontics into aligner trays or retainers has gained attention.⁴⁻⁶ In such approaches, digital technology including intraoral scanning, 3D modeling, and additive manufacturing facilitates precise design of pontics to match extracted teeth.

Clear aligner therapy has rapidly evolved into a mainstream orthodontic modality, offering patients superior esthetics, comfort, and convenience compared to fixed appliances.^{7,8} Aesthetic continuity during therapy is

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particularly valued by adult patients, who often opt for aligners to avoid the visibility of brackets and wires. Addressing interim edentulism before aligner delivery is therefore essential to patient satisfaction and overall treatment success.

This report describes the fabrication and clinical application of a pontic-filled Essix retainer designed as a temporary esthetic solution following extraction of a retained deciduous mandibular incisor. The technique utilized intraoral scanning, digital extraction, pontic design, 3D printing, and vacuum-formed Essix technology. The innovation lies in combining the simplicity and comfort of an Essix retainer with the esthetic continuity of a composite pontic, providing an immediate solution that integrates seamlessly into subsequent aligner therapy.

2. Case Presentation

2.1. Patient history and examination

A 28-year-old male presented for orthodontic consultation with the chief complaint of crowding and retained deciduous teeth. Clinical examination revealed a retained mandibular deciduous central incisor exhibiting mobility and pain on mastication. Radiographic evaluation confirmed root resorption and absence of a permanent successor. The treatment plan involved extraction of the deciduous tooth, followed by clear aligner therapy to resolve crowding and align the dentition. The patient expressed concern regarding esthetics during the waiting period for aligner fabrication and requested an immediate temporary solution.

Table 1: Comparison of temporary tooth replacement options prior to orthodontic aligner therapy

Method	Esthetics	Comfort	Cost	Invasiveness	Effect on Aligners
Removable partial denture (flipper)	Moderate	Low	Low	Non-invasive	Can interfere
Bonded pontic	High	Moderate	Moderate	Involves bonding	May interfere
Maryland bridge	High	High	High	Tooth preparation required	Interferes
Unfilled Essix retainer	Low	High	Low	Non-invasive	Minimal
Pontic-filled Essix retainer	High	High	Low	Non-invasive	Compatible

2.2. Clinical workflow

The clinical procedure began with an intraoral scan of both arches using the Trios 3Shape scanner to establish a precise

digital record (Figure 1). High-resolution scanning ensured accurate capture of the dentition and soft tissue morphology, which was critical for subsequent design steps. The scanned files were imported into 3D Maestro software, where segmentation of individual teeth was performed to allow virtual manipulation of the retained deciduous mandibular incisor. Following this, the deciduous incisor was extracted under local anesthesia, and the extraction was replicated digitally to create an accurate edentulous site in the virtual model (Figure 2). A pontic was then selected from the software’s library, scaled to match the morphology of the extracted tooth, and positioned in the space to achieve symmetry and alignment with the adjacent dentition.

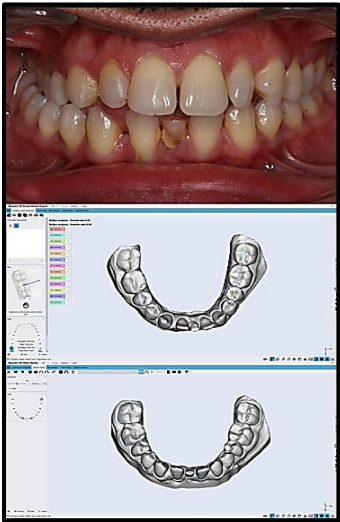


Figure 1: Initial records and digital preparation.

Pre-extraction intraoral view showing the retained deciduous mandibular central incisor along with digital workflow images from 3D Maestro software demonstrating tooth measurement and segmentation of the mandibular arch.



Figure 2: Virtual extraction and pontic design.

Digital simulation of incisor extraction with the corresponding post-extraction intraoral photograph. Pontic

selection from the 3D Maestro library and its placement in the mandibular anterior region are also illustrated.

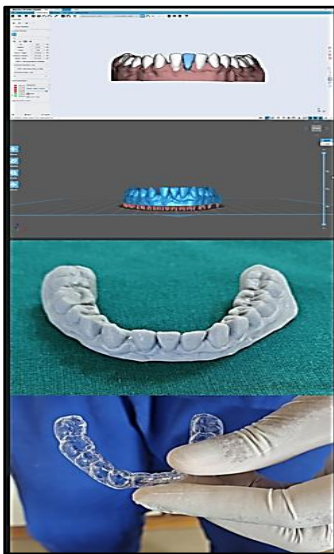


Figure 3: 3D printing and appliance fabrication.

Pontic-integrated digital model prepared for 3D printing, followed by the printed mandibular model. Subsequent steps show vacuum-formed Essix fabrication and chairside filling of the pontic space with tooth-colored composite resin.



Figure 4: Delivery and clinical outcome.

Completed Essix retainer with composite pontic, clinical finishing, and final intraoral view demonstrating successful esthetic integration and patient adaptation.

The final design was exported to Chitubox slicer software and prepared for additive manufacturing. The model was printed with the Phrozen Sonic Mighty 4K resin printer, producing a highly detailed replica of the patient's dentition with the integrated pontic (**Figure 3**). A 1 mm-thick Essix sheet was subsequently vacuum-formed over the printed model using the Erkodent Erkopress Motion thermoforming unit, creating a retainer with excellent adaptation and retention. To complete the appliance, the pontic site was filled with a tooth-colored flowable composite resin, sculpted chairside to reproduce the natural anatomy of a mandibular central incisor, and light-cured to provide strength, polish, and esthetic integration. The finished retainer was delivered immediately after extraction, restoring both function and appearance (**Figure 4**).

The appliance demonstrated a secure fit and did not interfere with occlusion or phonetics. The patient adapted

rapidly, reporting no difficulties with speech or mastication. The esthetic outcome was particularly well received, with the pontic blending harmoniously with adjacent teeth, restoring confidence in social interactions. Comfort was enhanced by the smooth contours and light weight of the retainer, and no soft tissue irritation was reported. Oral hygiene was easily maintained since the appliance could be removed for cleaning, minimizing plaque accumulation. Over the three-week period prior to aligner delivery, the pontic retained its structural integrity and color stability, with no dislodgement or wear. The patient consistently expressed satisfaction during follow-up visits, noting the psychosocial benefit of an uninterrupted smile during the transition to clear aligner therapy. Clinically, the pontic-filled Essix retainer also preserved space effectively and familiarized the patient with appliance wear, thus facilitating a seamless transition to aligner treatment.

The patient reported high satisfaction regarding esthetics, speech, and comfort. The retainer preserved the edentulous space for aligner therapy without interfering with function. Over the 3-week interim period before aligner delivery, no complications such as dislodgement or discoloration were observed.

3. Discussion

Temporary anterior tooth replacement is an essential aspect of orthodontic treatment planning, particularly when extractions precede the commencement of clear aligner therapy. The period between tooth removal and aligner delivery is often a source of anxiety for patients, as the esthetic compromise in the anterior region can negatively affect self-confidence and social interactions. In this context, the present case highlights the practicality and clinical relevance of incorporating a pontic into an Essix retainer using contemporary digital technology.

Recent advances in digital dentistry have introduced several innovative approaches for interim tooth replacement, particularly within the context of aligner-based orthodontic treatment. These methods generally fall into three categories: (1) directly 3D-printed retainers or aligners, (2) thermoformed trays incorporating digitally designed pontics, and (3) fully digital, chairside provisional prostheses.⁹⁻¹¹ Directly 3D-printed retainers offer high precision and reduced laboratory time; however, the available resins demonstrate limited intraoral durability and color stability, necessitating further material refinement.¹²⁻¹⁴ In contrast, the present approach thermoforming an Essix appliance over a 3D-printed model and subsequently sculpting a composite pontic combines the proven adaptability of vacuum-formed retainers with the accuracy of digital modeling, producing an immediate and esthetic provisional solution with minimal cost and invasiveness.

Comparable methods, such as digitally fabricated pontics integrated into clear aligners, have been reported

primarily as short clinical notes or technical tips, with limited emphasis on workflow standardization or clinical outcomes.¹⁵⁻¹⁷ The detailed, replicable protocol described in the present case therefore contributes novel evidence supporting the practical implementation of digitally designed pontic retainers in clinical orthodontics. Moreover, the broader prosthodontic literature on digital provisionalization, including CAD/CAM-milled or fully printed interim prostheses, underscores the increasing shift toward additive, model-driven esthetic solutions.¹⁸⁻²⁰ Collectively, these advances highlight that digitally designed pontic-filled retainers represent a clinically significant, patient-centered innovation that aligns with current trends toward efficient, minimally invasive, and esthetically driven orthodontic care.

Conventional solutions for interim tooth replacement each carry distinct limitations. Removable partial dentures, particularly flipper appliances, have long been employed to restore esthetics; however, their bulk, reliance on clasps, and tendency to interfere with speech often result in poor patient acceptance (**Table 1**). In addition, the forces exerted by clasps on adjacent teeth can complicate orthodontic tooth movement and compromise aligner fit. Bonded pontics offer improved stability and appearance but require adhesive bonding, which risks enamel alteration and may disrupt the precise seating of clear aligners. These restorations also necessitate removal prior to active orthodontic therapy, reducing their practicality in aligner-based treatments.²² Similarly, Maryland bridges, while highly esthetic, are associated with tooth preparation, increased laboratory costs, and extended fabrication time. Given their invasiveness and expense, they are seldom justifiable for short-term esthetic management before orthodontics. Even unfilled Essix retainers, sometimes used as a simple space cover, provide limited visual continuity and fail to offer functional replacement of the missing tooth.

In contrast, the pontic-filled Essix retainer addresses these challenges by combining the strengths of digital design, additive manufacturing, and thermoforming technology. From an esthetic perspective, the composite pontic can be contoured to closely mimic natural morphology, ensuring a seamless smile during the transitional phase. The non-invasive nature of this approach preserves adjacent tooth structure, as no bonding agents or mechanical retention are required. Moreover, the process is efficient and cost-effective, as intraoral scanning, digital segmentation, and in-office 3D printing facilitate rapid fabrication without reliance on external laboratories. Comfort is another key advantage; the appliance is lightweight, smooth in contour, and has negligible impact on speech. Importantly, because the retainer resembles the final shape of aligners, patients adapt more easily to subsequent aligner wear, thereby improving compliance.

Nonetheless, limitations remain. Composite resin pontics are prone to discoloration and wear, especially in

patients with high dietary staining exposure or parafunctional habits. Retention issues may arise if the Essix retainer is inadequately adapted, necessitating periodic adjustment. Furthermore, although the appliance provides esthetic continuity, it lacks the load-bearing capacity of permanent prostheses, and patients must be cautioned against applying excessive biting forces in the pontic region.

Looking forward, material innovations may further refine this technique. The integration of reinforced composites, hybrid resins, or CAD/CAM-milled pontics has the potential to improve strength and longevity. Future studies should not only assess the mechanical performance of pontic-filled retainers but also evaluate long-term outcomes related to periodontal health, patient-reported satisfaction, and efficiency of orthodontic treatment progression. Randomized controlled trials comparing pontic-filled Essix retainers with alternative interim prostheses would provide valuable evidence to establish clinical guidelines and optimize patient care.

In summary, the incorporation of a pontic into an Essix retainer offers a compelling balance of esthetics, comfort, and practicality. By harnessing digital workflows and minimally invasive principles, this technique provides orthodontists with an efficient solution to a common esthetic challenge, while paving the way for further innovation in the interface between orthodontics and restorative dentistry.

4. Conclusion

The pontic-filled Essix retainer provides a practical, esthetic, and cost-effective interim solution for anterior tooth replacement before clear aligner therapy. Its digital fabrication workflow combining intraoral scanning, virtual extraction, 3D printing, and thermoforming ensures precision, comfort, and rapid chairside delivery. Clinicians should focus on achieving accurate adaptation and smooth pontic contouring, while advising patients on proper hygiene and avoidance of excessive biting forces to maintain longevity. Although minor limitations such as potential discoloration and reduced load-bearing strength exist, the technique remains a valuable addition to the orthodontist's armamentarium. Future studies exploring reinforced materials and long-term clinical outcomes could further enhance its applicability and durability.

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6. Source of Funding

None.

7. Conflicts of Interest

There are no conflicts of interest.

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