

A Novel Technique Using Extracted Primary Maxillary Canines in an Essix Retainer

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Abbreviations: GBR: Guided Bone Regeneration

Introduction

Extraction of teeth can be an emotional situation for patients, as some patients perceive the loss of a tooth equal to the loss of an organ [1]. Loss of anterior teeth can be detrimental to a patient's psychosocial and professional lives. Missing a tooth in the esthetic zone can lead to emotional turmoil and cause the patient to avoid social events or professional gatherings until the tooth is replaced [1].

Patients often desire immediate replacement of the tooth with a fixed or removable dental prosthesis to achieve an esthetically acceptable smile [2]. Each treatment option carries advantages and disadvantages. Immediate implants, for example, have increased costs, added surgical procedures, and biological requirements which must be met. Not every patient is a candidate for implants, due to wide variety of

factors such as systemic medical conditions, poor oral hygiene, or malocclusion [3].

Fixed partial dentures require preparation of adjacent teeth prior to extraction. The restoration must also be made either before surgery by a laboratory or post surgically. Resin bonded fixed dental prostheses (commonly referred to as Maryland bridges) can be a conservative preparation of the adjacent teeth, however patient selection and occlusal analysis is crucial in long term success of such prostheses [4]. Both implants and fixed partial dentures provide the patient with a prosthesis that does not need to be removed from the mouth on a regular basis for hygiene or sleeping. However, a fixed prosthesis is not always the best treatment option, and a removable prosthesis may become the treatment of choice for short or long-term treatment.

Replacement of extracted teeth immediately after surgery with removable prosthodontics can be accomplished several different ways to include the use of a transitional partial denture or an Essix retainer. Smith and Rymarz in 1969 described the fabrication of a transitional partial denture to replace missing teeth [5]. The transitional partial denture is a removable prosthesis that is fabricated with denture acrylic, denture teeth, and wired ball clasps for retention. Patel et al. in 2014 described a unique way to replace extracted maxillary central incisors by fabricating an Essix retainer with acrylic denture teeth [6]. Removable treatment options tend to cost less for the patient than fixed and can provide acceptable esthetics. As with fixed prosthodontics, removable options take pretreatment planning and lab time to fabricate the prosthesis.

Materials and Methods

A 42-year-old female reported to the prosthodontic clinic for comprehensive treatment with the chief complaint of “I want to get rid of my baby teeth.” The patient was congenitally missing the maxillary second premolars and the permanent maxillary canines, with retained maxillary primary canines (**Fig. 1**). The patient was not satisfied with her current smile and wanted a more permanent solution to her mobile maxillary primary canines (**Fig. 2**). The primary maxillary canines exhibited Miller class 2 mobility (≤ 1 mm in the orofacial dimension) with severely resorbed roots. The right maxillary central incisor had a defective metal ceramic crown and prior endodontic treatment.

Figure 1: Pre-operative panoramic radiograph.



Figure 2: Pre-operative smile.



Informed consent and photographic consent were obtained, and initial alginate impressions were made. The treatment plan included orthodontics, periodontics, and fixed prosthodontics, to include placement of implants at the maxillary canine positions and ceramic crowns on the

maxillary anterior dentition. The patient completed orthodontic treatment to upright mesially tilted maxillary first premolars. A CBCT scan indicated that guided bone regeneration (GBR) was necessary in the maxillary canine areas due to significant alveolar undercuts. A diagnostic

workup was completed which included alginate impressions and fabrication of an Essix retainer utilizing a 1 mm thick plastic vacuum formed sheet (Great Lakes, USA). The Essix retainer was prepared for the day of surgery by air abrading the primary canine positions and then applying Bond LC (Anax, USA) and light curing.

The maxillary primary canines were extracted, and the soft tissue was removed from the extracted teeth. An Nd:YAG Laser (3.0 W, 100 μ s, 20 Hz) was used to establish a clot in each extraction socket. A total of 350J was delivered to the facial, occlusal, and palatal aspects of the site, with the fiber

located 2.5 to 3.5 cm above the tissue. The two teeth were contoured to form ovate shaped roots, composite resin was added to the apex of the root to contour as desired, and the teeth were then highly polished. The extracted primary canines were etched with phosphoric acid, rinsed with copious water, and then placed in the Essix retainer in their respective positions using Bond LC to bond them (**Fig. 3**). The Essix retainer was delivered to the patient, ensuring the ovate pontics sat in the extraction sockets as desired to help maintain soft tissue architecture in preparation for implant placement after GBR (**Figs. 4 and 5**).

Figure 3: Extracted primary canines bonded into Essix retainer.



Figure 4: Essix in place immediately after extraction of primary canines.



Figure 5: Essix retainer in place 4 weeks post-surgery.



Discussion

Challenges exist when extracting teeth in the esthetic zone. Patients usually desire an immediate replacement of the tooth to maintain an esthetically pleasing smile and proper phonetics. In 2000 Ruth Freeman published an article discussing the loss of teeth and patient emotions. She made the following conclusions:

1. A significant majority of people have difficulty accepting the loss of their teeth.
2. Many patients felt unprepared for the effects of tooth loss and would have liked more information from the dentist prior to tooth extraction.
3. When informing patients of the need to extract teeth, break the news on a day before surgery.
4. It is useful to not only verbally discuss tooth loss with the patient but to provide written information on the need to extract, outcome of extraction, and treatment options [7].

Replacing extracted teeth serves several purposes to include restoring esthetics, maintaining proper phonetics, and maintaining the emotional psyche of the patient. When treatment planning teeth for extraction it is important to determine if the extracted tooth is in the patient's esthetic zone, which is described as the teeth that can be seen during full smile. Usually, the esthetic zone expands from maxillary canine to canine, however it can extend as far back as the second premolar [8]. Once it is determined that a tooth needs to be extracted from the esthetic zone, treatment options should be considered to immediately replace the extracted tooth after surgery. Treatment options for immediate replacement of extracted tooth may include an implant with an immediate provisional crown, a fixed dental prosthesis, a transitional partial denture, or an Essix retainer with a tooth pontic. Determining which option is best for the patient is determined by the patient's desires, patient's health status, biological and anatomical considerations, future treatment planned, and the socioeconomic status of the patient [8].

Removable prosthodontics often become the treatment option of choice to replace an extracted tooth. Removable prostheses offer several advantages to fixed prostheses to include: the ability to remove from mouth for hygiene and visual assessment of the surgical site, lower cost, and relative ease

of fabrication. Removable prosthodontics often are chosen as a temporary treatment option when additional surgical procedures such as ridge augmentation are needed before implant placement. Transitional removable prostheses can be fabricated in a variety of ways such as utilizing a denture tooth and pink acrylic or a denture tooth placed into vacuum form plastic. Denture teeth can be hard to match to the patient's existing dentition and often don't match exactly to what the patient had. In this case report a technique was demonstrated that replaced the extracted teeth with the exact same tooth thus restoring the patient's smile to what it was before surgery. The patient was able to leave the clinic with a smile that was the same as before surgery with little to no impact to the patient's psyche, social, and professional life.

Conclusion

Extraction of teeth in the esthetic zone can be challenging for patients and providing a treatment option to immediately replace the extracted tooth is often highly desired for patients. This article describes a novel procedure to provide the patient with a highly esthetic treatment option to replace extracted teeth when implants or fixed dental prostheses are not an option. This simple technique utilizes the extracted tooth and Essix to provide a removable treatment option when other procedures such as an implant or fixed dental prosthesis is not an immediate option.

Declarations: none

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Individual Author Contribution Statement: ASR and BFO collected and analyzed the data and drafted the original manuscript. SDM, JVS, TMJ, and SEH designed this case report, reviewed, and edited the manuscript. ASR and BFO performed the clinical procedures. SDM, JVS, TMJ, and SEH were residency mentors during procedure and treatment planning. All authors read and approved the final manuscript.

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