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Case Report

Autotransplantation of a mature wisdom tooth to a recipient site with a large endodontic lesion: a case report

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CLINICAL SIGNIFICANCE

Successful autotransplantation of a vital wisdom tooth using minimally invasive techniques and CEM cement for root-end filling demonstrates the procedure's feasibility, emphasizing optimal endodontic management for long-term success in replacing non-restorable teeth.

ABSTRACT

Tooth autotransplantation is a valuable treatment option for various dental conditions, offering the potential to preserve natural dentition and restore oral function. This case report describes the successful autotransplantation of a vital wisdom tooth (tooth 38) in a 34-year-old woman to a recipient site (tooth 37) with a non-restorable endodontically treated tooth and a large endodontic lesion. The procedure involved atraumatic extraction of tooth 37, extraoral root-end preparation and filling of tooth 38 with calcium-enriched mixture (CEM) cement, and immediate repositioning of tooth 38 into the extraction socket of tooth 37. Postoperative follow-up demonstrated successful healing, integration, and functional adaptation of the transplanted tooth. This case report highlights the clinical feasibility and favorable outcomes of autotransplantation using minimally invasive techniques and emphasizes the importance of proper endodontic management in ensuring long-term success.

1. Introduction

Tooth autotransplantation is a technique that involves the extraction and repositioning of a donor tooth from one site to another recipient socket within the same individual.[1] Over the years, various techniques have been employed to enhance the success rate of this procedure and optimize the outcomes for both the donor and recipient sites.[2] Advancements in technology, including the use of cone-beam computed tomography (CBCT), have contributed to the development of innovative approaches in autotransplantation; it aids in comprehensive assessments for better treatment planning, particularly in the evaluation of root morphology, bone structures, and pathological conditions. In addition, computer-aided rapid prototyping or tooth replica, enabling accurate positional planning and improving surgical ease.[3, 4] Autotransplantation offers the advantage of preserving natural dentition and restoring oral function, making it an attractive treatment option in dentistry.

Studies have reported varying success rates for autotransplantation procedures, with factors such as patient age, donor tooth type, and surgical technique influencing the outcomes.[5] Generally, the success rates range from 75% to 95% for teeth transplanted to the permanent dentition and are even higher for premolars and incisors compared to molars.[2, 5] The prognosis of autotransplanted teeth can also be influenced by factors such as root development stage, periodontal ligament integrity, and the presence of associated pathologies.[5]

One crucial aspect in the success of autotransplantation is the endodontic treatment for the transplanted tooth. The meticulous management of the pulp and root canal system is vital to ensure the long-term survival and function of the transplanted tooth. This typically involves root canal treatment (RCT) of the tooth prior to transplantation, ensuring that the pulp is properly cleaned, shaped, and filled with an appropriate endodontic material.[6]

Additionally, the use of novel biomaterials, such as calcium-enriched mixture (CEM) cement, for root-end filling during endodontic surgeries has gained attention.[7] CEM cement exhibits excellent biocompatibility, sealing ability, bioactivity, and cementogenesis which can contribute to successful periradicular healing.[8] Studies have reported favorable outcomes with the use of CEM cement in surgical endodontics [9], highlighting its potential as an effective endodontic biomaterial for transplanted teeth.

Autotransplantation offers the advantage of preserving natural dentition and restoring oral function, making it an attractive treatment option in dentistry. This case report aims to describe the successful autotransplantation of a vital wisdom tooth using minimally invasive techniques, emphasizing the role of CBCT-assisted assessments, and underscoring the importance of proper endodontic management for achieving favorable long-term outcomes.

2. Detailed Case Description

A 34-year-old woman presented with a non-restorable failed endodontically treated tooth 37, which caused discomfort and pain. Upon clinical examination, it was evident that tooth 37 had recurrent caries beneath a non-suitable porcelain-fused-to-metal (PFM) crown, periodontal probe >3mm, and an adjacent fully erupted/healthy wisdom tooth. Due to the patient's severe gag reflex during intraoral radiography, an orthopantomogram (OPG) image was obtained instead (Fig. 1A), revealing additional findings such as a non-fitted PFM crown, multiple recurrent caries, poor endodontic treatment, and a large endodontic lesion (Fig. 1B-D). Cone-beam computed tomography (CBCT) scans further

confirmed extensive bone destruction around the tooth 37 and perforated buccal cortical bone (Fig. 1B-D).

To determine the most appropriate treatment approach, a comprehensive evaluation was conducted, consisting of a thorough clinical examination, CBCT assessments, and a review of the patient's dental and medical history. The assessment revealed that tooth 38 exhibited similar root morphology to tooth 37 and maintained a healthy periodontal condition. In contrast, tooth 37, the recipient site, displayed a large apical lesion of endodontic origin as observed on the CBCT scans. Consequently, tooth 37 was determined to be non-restorable.

Based on these findings, tooth autotransplantation emerged as a viable and advantageous treatment option for the patient. The patient expressed a strong desire to preserve her natural dentition and avoid tooth loss whenever possible. Additionally, the patient's normal medical history further supported the suitability of autotransplantation as the chosen treatment approach.

After obtaining informed consent and administering local anesthesia, tooth 37 was extracted using gentle elevation and luxation techniques. Subsequently, tooth 38 was atraumatically extracted, and extraoral root-end preparation and root-end filling were performed using CEM cement (BioniqueDent, Tehran, Iran). The decision to opt for retrograde root-end filling instead of traditional orthograde root canal treatment was deliberate and guided by the aim to achieve a three-dimensional seal at the exit of root canals without unnecessary destruction of tooth structure. Without any curettage, the extraction socket of tooth 37 was meticulously cleaned using copious irrigation with sterile normal saline in preparation for receiving tooth 38. With careful attention to alignment and occlusal harmony, tooth 38 was directly repositioned in the extraction socket of tooth 37. The tooth was gently guided into its new position to ensure proper integration and stability (Fig. 1E). The patient received detailed postoperative instructions, including guidance on proper oral hygiene measures and adherence to a soft diet during the initial healing period. Regular follow-up appointments were scheduled to monitor the progress of the healing process and ensure optimal outcomes.

During the 1-month follow-up examinations, the patient reported no discomfort or functional issues associated with the transplanted tooth. Clinical and radiographic assessments showed successful healing of the endodontic lesion and proper integration of tooth 38 at the 1-year follow-up (Fig. 1F). At the 5-year follow-up, the transplanted tooth exhibited a normal periodontal ligament width and demonstrated functional adaptation within the occlusal scheme (Fig. 1G). These positive outcomes indicate the success of the autotransplantation procedure and the favorable integration of the transplanted tooth into the patient's oral environment.

3. Discussion

Tooth autotransplantation is a complex procedure that involves

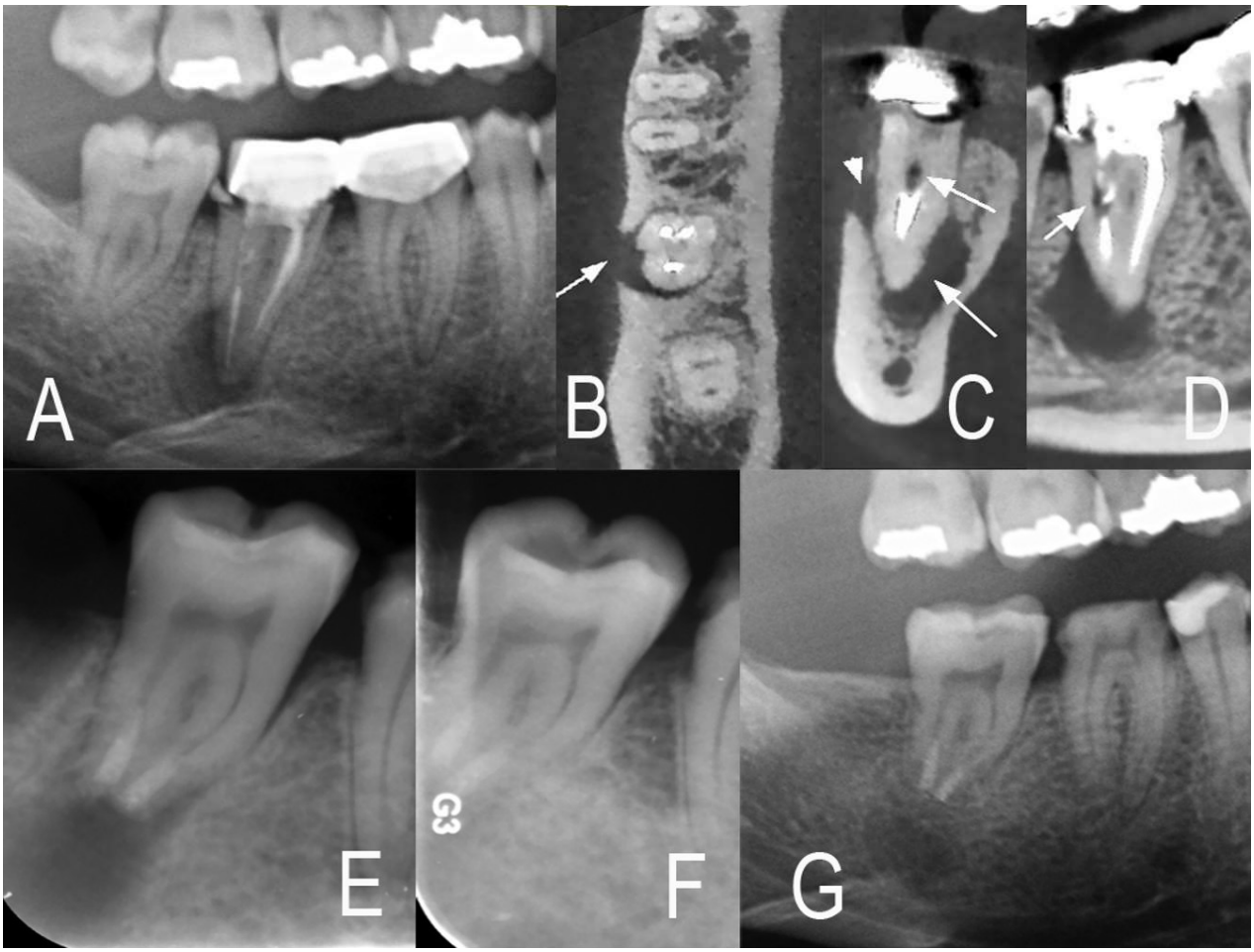

Fig. 1. Radiographic Presentation of Autotransplantation Procedure (A) Orthopantomogram (OPG) image showing tooth 37 with a defective PFM crown, recurrent caries, poor root canal obturation, and a large endodontic lesion. (B-D) Cone-beam computed tomography (CBCT) scans, in axial/coronal/sagittal planes, demonstrating extensive bone destruction around tooth 37 and perforated buccal cortical bone. (E) Immediate postoperative radiograph confirming the successful tooth autotransplantation procedure. (F) Radiographic assessment at the 1-year recall, demonstrating successful healing of the endodontic lesion and proper integration of tooth 38. (G) Radiographic assessment at the 5-year recall, showing a normal periodontal ligament width and functional adaptation of the transplanted tooth within the occlusal scheme.

the extraction and repositioning of a tooth from one site to another within the same individual. In this case report, autotransplantation was successfully performed in a 34-year-old woman with a non-restorable failed endodontically treated tooth 37, utilizing a minimally invasive approach. The patient's preference to preserve her natural dentition and avoid tooth extraction made autotransplantation an appealing treatment option. Autotransplantation offers several advantages compared to tooth extraction and the need for replacement.[10] By preserving the natural dentition, autotransplantation helps maintain occlusal harmony and eliminates the requirement for invasive procedures and their associated complications. In this specific case, autotransplantation also provided the potential for periodontal regeneration, further enhancing the long-term stability and success of the treatment.[11] Furthermore, the success of autotransplantation depends on the meticulous surgical techniques employed and the proper management of the transplanted tooth. In this case, a minimally invasive approach was utilized, ensuring atraumatic extraction of tooth 37 and preservation of the periodontal ligament during the extraction of tooth 38. Additionally, the extraction of tooth 37 helped to eliminate the etiologic factors associated with the large endodontic lesion, contributing to its healing.

The decision to proceed with autotransplantation was made after a comprehensive evaluation, encompassing a thorough clinical examination and using CBCT assessments as a helpful tool.[12] It is important to note that computer-aided rapid prototyping or other techniques were not employed in this case. Instead, CBCT imaging alone was used to ensure the adaptability of tooth 38 to the recipient site. The assessment revealed that the recipient site, tooth 37, had a large apical lesion that was visible on CBCT scans, indicating a suitable size for placement of tooth 38. The donor tooth, tooth 38, also exhibited favorable/similar root morphology and a healthy periodontal condition. These findings supported the suitability of autotransplantation as the preferred treatment option for this case.

In cases where the orthograde approach is taken, accessing the crown, preparing the entire root canals, and obturating the canal path until the root apex is a standard procedure to ensure comprehensive sealing. However, when accessing the root apex via surgery, the need for traditional root canal treatment that involves the removal of significant tooth structure becomes unnecessary. The retrograde filling in this scenario was chosen to preserve maximum tooth structure, maintaining the natural strength and durability of the transplanted tooth while effectively addressing endodontic pathology. This approach not only aims to achieve the desired therapeutic outcome but also minimizes unnecessary invasive procedures, contributing to the overall success and longevity of the treatment.

The placement of the root-end filling using an endodontic biomaterial plays a critical role in the success of the procedure.[13] When the root-end filling is placed appropriately, it can effectively seal the path of communication between the root canal system and the periradicular tissues. By sealing the root-end, the risk of microbial contamination and subsequent inflammation in the periradicular tissues is minimized. The use of biomaterials such as CEM cement for root-end filling has been shown to provide an effective seal and promote cementogenesis.[8]

Regular follow-up visits and radiographic assessments are essential to monitor the healing process and evaluate the integration and stability of the transplanted tooth. In this case, the patient reported no discomfort or functional issues related to the transplanted tooth at the 1-month follow-up. Clinical and radiographic assessments confirmed successful healing of the extraction site and proper integration of tooth 38 at the 1-year follow-up. The transplanted tooth exhibited normal PDL and showed signs of functional adaptation within the occlusal scheme at the 5-year recall.

4. Conclusion

In conclusion, this case report demonstrates the successful autotransplantation of a vital wisdom tooth, after root-end filling with CEM cement, to replace a non-restorable failed endodontically treated tooth. Autotransplantation proves to be a valuable treatment option for preserving natural dentition, achieving occlusal harmony, healing endodontic lesions, and potentially promoting periodontal regeneration. With careful case selection, meticulous surgical techniques, and appropriate endodontic management, autotransplantation can provide favorable outcomes and contribute to the long-term oral health and function of patients.

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Conflict of Interest
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