

The DTR technique© for rehabilitation of non-restorable teeth: A case report

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Abstract

The rehabilitation of non-restorable teeth in implant dentistry presents a significant clinical challenge, particularly in cases associated with thin buccal cortical plates and a high risk of post-extraction ridge resorption. Direct Through Root (DTR) implant placement is an emerging technique that utilizes the retained root as a guide for implant osteotomy, followed by atraumatic root removal, thereby facilitating precise implant positioning while minimizing surgical trauma. This case report describes the management of a mandibular posterior region involving non-restorable first and second molars with severe attrition and compromised crown structure. A DTR approach was employed to preserve alveolar ridge architecture and ensure optimal implant positioning. Following decoronation, osteotomy was initiated through the retained root structure, and the remaining root fragments were atraumatically extracted. A Bioner implant (5 × 10 mm) was placed with satisfactory primary stability while maintaining an appropriate peri-implant distance from the adjacent natural tooth. The peri-implant gap was grafted using Regeneross to enhance bone regeneration. After a healing period of three months, prosthetic rehabilitation was completed using a screw-retained PFM crown. The case demonstrated favorable functional outcomes with stable peri-implant tissues.

Keywords: Direct Through Root (DTR), Dental Implants, Non-Restorable Teeth, Ridge Preservation, Implant Rehabilitation

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Introduction

Rehabilitation of non-restorable teeth with dental implants requires careful consideration of alveolar ridge preservation and optimal implant positioning. Following tooth extraction, physiological bone remodeling leads to significant dimensional changes in the alveolar ridge,^[1,2] particularly affecting the buccal cortical plate due to its thin structure and limited blood supply. These alterations can compromise both functional and prosthetic outcomes, often necessitating additional augmentation procedures.^[3]

To address these challenges, minimally invasive approaches have been explored to preserve alveolar bone and maintain tissue architecture during implant placement.^[4,5] The Direct Through Root (DTR) technique has recently been

introduced as a novel surgical approach in which implant osteotomy is initiated through the retained root structure prior to its removal. This method allows the root to act as a natural guide for implant positioning, potentially improving accuracy and reducing surgical trauma.^[6]

The DTR technique may offer several advantages, including preservation of the surrounding bone, maintenance of vascular integrity, and reduction in the extent of flap elevation and bone manipulation.^[4,6] Additionally, it facilitates implant placement in a prosthetically driven position while minimizing the risk of buccal plate collapse.^[7] Despite its promising clinical potential, DTR remains an evolving technique with limited scientific literature. Therefore, its application requires careful case selection, precise surgical execution, and appropriate management of peri-implant defects. This case report aims to present the clinical application of the DTR technique for the rehabilitation of non-restorable mandibular molars, highlighting its surgical protocol, advantages, and clinical outcomes.

Case Report

Patient Information and Diagnosis

A patient presented with severely attrited mandibular posterior first and second molars exhibiting reduced occlusal anatomy and compromised structural integrity. The patient reported difficulty in mastication. Clinical examination revealed significant loss of crown structure, occlusal wear facets, and reduced crown height, rendering the teeth non-restorable. No signs of acute infection were observed. Radiographic evaluation (RVG) demonstrated intact root structures with adequate apical bone support and a thin buccal cortical plate, indicating a high risk of post-extraction ridge resorption. (Fig. 1)

Treatment Planning and Rationale

Considering the non-restorable condition of the teeth and the presence of a thin buccal cortical plate, a Direct Through Root (DTR) implant placement approach was selected. The primary objectives were:

- Preservation of alveolar ridge architecture
- Minimization of surgical trauma
- Accurate implant positioning
- Reduction in the need for additional augmentation^[8]



Fig. 1. Pre-operative RVG

Surgical Procedure

All procedures were performed under strict aseptic conditions using local anesthesia.

1. Decoronation

The clinical crowns of the involved molars were removed at the gingival level to expose the root structure.

2. Osteotomy Through Root

Sequential osteotomy was initiated through the retained root structure under copious irrigation. The retained root served as a natural guide for ideal implant angulation and positioning while maintaining a safe peri-implant distance from the adjacent natural tooth structures.^[9,10] (Figs. 2 and 3)



Fig. 2. Implant surgical guide pin placement

3. Atraumatic Root Extraction

Following decoronation, osteotomy preparation, the remaining root fragments were atraumatically extracted.

4. Implant Placement

A Bioner implant (5×10 mm) was placed into the prepared osteotomy site, achieving satisfactory primary stability.

5. Management of Jumping Distance

The peri-implant jumping distance was grafted using Regeneross to enhance bone regeneration and support peri-implant tissue stability.^[8]

6. Closure

A cover screw was placed, and soft tissue closure was achieved where necessary. (Fig. 4)



Fig. 4— Implant placement with cover screw

Postoperative Care

The patient was prescribed antibiotics, analgesics, and Blue M mouth rinse. Postoperative instructions included maintenance of oral hygiene and avoidance of mechanical loading in the surgical area.

Healing and Follow-Up

Healing was uneventful, with no signs of infection, implant mobility, or soft tissue complications. Clinical follow-up demonstrated healthy peri-implant mucosa and stable tissue contours. After three months, adequate implant stability was confirmed both clinically and radiographically.

Prosthetic Phase

Second-stage surgery was performed, and prosthetic rehabilitation was initiated. An impression was made, and a screw-retained PFM crown was fabricated and delivered. The final prosthesis exhibited proper occlusion, satisfactory esthetics, and functional efficiency. The patient reported improved comfort and masticatory function. (Figs. 5–7)

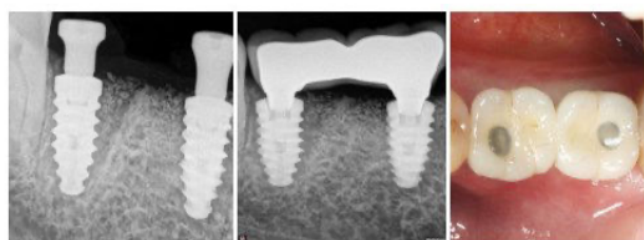


Fig. 5-7 Healing abutment, screw-retained PFM crown.

Discussion

Management of non-restorable teeth in implant dentistry requires treatment strategies that preserve alveolar bone and ensure long-term peri-implant tissue stability. Conventional extraction techniques are often associated with significant bone resorption, particularly in areas with a thin buccal cortical plate, which may negatively affect implant positioning and prosthetic outcome.

The Direct Through Root (DTR) technique represents a novel approach in which implant osteotomy is guided by the retained root structure before its removal. This method may improve surgical precision, maintain the existing alveolar architecture, and reduce the risk of implant malpositioning in anatomically challenging sites.^[11]

In the present case, the DTR technique facilitated preservation of the buccal cortical plate and enabled prosthetically driven implant placement while maintaining an appropriate distance from the adjacent natural tooth. The atraumatic nature of the procedure contributed to preservation of vascular supply and minimization of bone loss.^[4] In addition, grafting of the peri-implant jumping distance with regeneross supported bone regeneration and peri-implant tissue stability.^[8]

From a clinical perspective, the DTR technique may reduce the need for extensive ridge augmentation procedures and improve overall treatment efficiency.^[7,9,10] However, the technique remains highly sensitive and requires comprehensive understanding of root anatomy, implant positioning principles, and atraumatic surgical protocols.^[12,13] The principal limitation of this technique is the lack of long-term clinical evidence. Further randomized controlled trials and longitudinal clinical studies are necessary to validate its predictability, long-term success rates, and potential complications.

Immediate implant placement has long been advocated for preservation of alveolar bone and reduction of treatment time.^[11,12] Guided tissue regeneration and management of deficient bony housing remain important consideration in implant therapy.^[14,15]

Conclusion

The Direct Through Root (DTR) technique offers a promising and minimally invasive approach for the rehabilitation of non-restorable teeth. It enables preservation of alveolar ridge architecture, precise implant placement, and favorable functional outcomes. Within the limitations of this case report, DTR demonstrates significant clinical potential. However, further long-term studies are essential to establish standardized protocols and confirm its reliability in routine implant practice.

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