

Optimized Tooth Preservation Using Root Resection and Regenerative Techniques for a Maxillary Molar with Distobuccal Root Pathology: A Case Report

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Abstract

Root resection, or root amputation, is a periodontal procedure aimed at preserving multi-rooted teeth by removing a diseased root while maintaining the remaining structure. This case report presents a 45-year-old female patient who reported discomfort and mild mobility in the upper left molar region. Clinical examination revealed advanced periodontal disease with a deep pocket and bone loss around tooth 26. Root resection of the distobuccal root of tooth 26 was performed, followed by regenerative therapy using cancellous bone block grafting. A mucoperiosteal flap was raised, and the distobuccal root was carefully sectioned and extracted. The defect was filled with a bone graft, and the flap was sutured. Post-operative care included antibiotics, anti-inflammatories, and chlorhexidine mouthwash, followed by splinting for tooth stabilization. At 1-and 3-month follow-ups, no mobility was observed, soft-tissue healing was satisfactory, and radiographs showed new bone formation around the grafted site. This case highlights the effectiveness of root resection combined with regenerative therapy in preserving function and improving periodontal health.

Keywords: Root pathology, Root resection, Tooth preservation.

INTRODUCTION

Root resection, or root amputation, is a specialized periodontal procedure aimed at preserving multi-rooted teeth that have compromised roots due to periodontal or endodontic disease. This procedure involves the surgical removal of a diseased or damaged root while retaining the remaining sound root structure and the tooth itself. Root resection was first introduced by Farrar^[1] in the late 19th century and has since evolved into a well-documented procedure that can prolong the life of teeth that would otherwise require extraction. In contemporary periodontal practice, it is often used in conjunction with regenerative procedures, such as bone grafting, to enhance healing and long-term prognosis.^[2] The rationale for root resection stems from the desire to maintain natural dentition for as long as possible, avoiding more invasive interventions such as extractions or dental implants. Multi-rooted teeth, such as maxillary molars, are frequently affected by advanced periodontal disease, particularly in the furcation areas where the roots diverge. These areas are prone to plaque accumulation and can become difficult to clean, leading to progressive bone loss and tooth mobility.^[3] By resecting a diseased root and applying regenerative materials, clinicians can preserve the

affected tooth's function and esthetics while improving the surrounding tissues' periodontal condition.^[4]

The procedure is indicated primarily in cases where advanced periodontal disease, fractures, or caries severely compromise one or more roots of a multi-rooted tooth. Root resection is most beneficial when other conservative treatments, such as scaling and root planning or conventional periodontal surgery, have failed to arrest the progression of disease.^[5] It is also indicated in cases of vertical or horizontal root fractures that affect only one root, while the remaining roots are healthy and capable of supporting the tooth.^[6] In addition, root resection can be considered when there is advanced furcation involvement with a poor prognosis for one of the roots, while the other roots exhibit minimal or no bone loss.^[7] The procedure is

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often applied when the affected tooth has a favorable crown-to-root ratio post-surgery, which allows for functional occlusal loading without compromising the long-term stability of the tooth.^[8] However, root resection is contraindicated in cases where the overall periodontal condition of the tooth is poor, with extensive bone loss involving all roots or unfavorable anatomical factors that compromise the crown-to-root ratio.^[9] In addition, poor patient compliance with oral hygiene maintenance and periodontal therapy can severely limit the success of the procedure. Teeth with severely compromised roots that are not amenable to restorative treatment or cases where the occlusion cannot be properly balanced post-surgery are also considered poor candidates for root resection.^[10] Finally, systemic conditions that affect wound healing, such as uncontrolled diabetes or immunosuppressive disorders, may further reduce the likelihood of successful outcomes.^[11]

CASE REPORT

Clinical presentation

A 45-year-old female patient presented with a chief complaint of discomfort and mild mobility associated with the left upper back tooth region. On clinical examination, advanced periodontal disease was detected, manifesting as a deep pocket (7–8 mm) on the distal aspect of tooth 26, Grade I furcation involvement, and Grade I mobility (Figure 1). Radiographically, tooth 26 displayed a distobuccal carious lesion for which root canal treatment had been previously administered, as well as vertical bone loss on the distal aspect with significant involvement of the distobuccal root. Based on the clinical findings patient was diagnosed as generalized periodontitis Stage III Grade B.

Treatment plan

The treatment plan consisted of root resection of the distobuccal root of tooth 26, followed by regenerative therapy.

Surgical procedure

Step 1: Access flap surgery

A full-thickness mucoperiosteal flap was raised under local anesthesia, providing access to the defect on the distobuccal aspect and the furcation area of tooth 26 (Figures 2 and 3).

Step 2: Root resection of distobuccal root of tooth 26

The distobuccal root of tooth 26 was sectioned by giving an oblique cut using tapered fissure bur and airroaster and carefully extracted. The furcation area was debrided and irrigated to ensure a clean surgical site (Figures 4–6).

Step 3: Placement of bone grafts

A cancellous bone block graft was placed in the vertical defect with respect to the distal aspect of #26, followed by the placement of a gel sponge (Figures 7 and 8).

Step 4: Suturing

The flap was repositioned and secured with 4–0 non-absorbable silk sutures. One horizontal mattress suture was placed, and four simple interrupted sutures were placed (Figure 9).



Figure 1: Pre-operative radiograph



Figure 2: Incision



Figure 3: Reflection

Post-operative care

Post-operative care included antibiotics, anti-inflammatory medications, and chlorhexidine mouthwash. Sutures were removed after 15 days, and composite fiber splinting was applied to stabilize the teeth wrt 24, 25, 26, and 27.



Figure 4: Occlusal view of defects



Figure 7: Graft placement



Figure 5: Post-operative radiograph



Figure 8: Gel sponge placement



Figure 6: Extracted root

FOLLOW-UP AND RESULTS

The patient was followed up at 1 month and 3 months. No mobility was observed in teeth 26 and the soft-tissue healing was satisfactory. Radiographs at the 3-month follow-up

showed signs of bone formation around the grafted site (Figures 10 and 11).

DISCUSSION

Root resection is a well-validated technique in periodontal therapy, particularly for multi-rooted teeth where one root is compromised while the others remain viable. The procedure offers a conservative alternative to extraction and aims to preserve as much of the natural dentition as possible. Numerous studies support the efficacy of root resection in conjunction with regenerative procedures, particularly when used in molars affected by furcation involvement.

A seminal study by Hamp *et al.* (1975)^[3] demonstrated that root resection could be successfully used to treat teeth with advanced furcation involvement. In their 5-year follow-up study, 75% of the treated teeth remained functional without significant progression of periodontal disease.^[12] This study laid the groundwork for the broader application of root resection in periodontal therapy, particularly for maxillary and mandibular molars. Basaraba (1979)^[13] further emphasized the importance of proper case selection in root resection, noting



Figure 9: Suture placement



Figure 10: First-month post-operative radiograph



Figure 11: Third-month post-operative radiograph

that teeth with healthy, remaining roots and a favorable crown-to-root ratio had the best prognosis following the procedure.^[13] He also highlighted the need for meticulous surgical technique and post-operative care to prevent complications such as root fractures or recurrent periodontal infection. In cases where

root resection is performed in conjunction with regenerative therapies, such as bone grafting, the long-term prognosis is significantly improved.^[14] Studies by Carnevale *et al.* (1991)^[5] examined the long-term effects of root-resective therapy in furcation-involved molars. Their findings indicated that root-resected teeth exhibited similar long-term stability compared to teeth that had undergone conventional periodontal therapy. The use of regenerative materials, such as demineralized freeze-dried bone allograft (DFDBA) and freeze-dried bone allograft (FDBA), enhanced the outcomes by promoting new bone formation around the resected root and improving the overall periodontal health of the treated tooth.^[15] Another important study by Lekovic *et al.* (1983)^[4] demonstrated the effectiveness of bone grafts in enhancing the outcomes of root resection procedures. Their research showed that the use of allografts and other regenerative materials significantly improved periodontal attachment and bone regeneration, particularly in defects associated with root resection.^[16] The use of DFDBA and FDBA in combination with root resection has become a standard approach in periodontal therapy, as it allows for the regeneration of bone around the compromised area and improves the long-term prognosis of the treated teeth.^[17] In recent years, root resection has been increasingly combined with guided tissue regeneration (GTR) techniques to enhance periodontal healing. Studies by Rosenberg *et al.* (1992)^[2] and Park *et al.* (2014) highlighted the importance of combining root resection with regenerative materials to improve outcomes. Their research demonstrated that the use of GTR membranes in conjunction with root resection not only promoted bone regeneration but also reduced the incidence of root caries and recurrent periodontal disease.^[10,18] The success of root resection also depends on patient compliance with oral hygiene and regular maintenance. Lindhe *et al.* emphasized that patients who adhered to strict oral hygiene protocols and attended regular follow-ups had a significantly better prognosis compared to those who were non-compliant.^[19] This underscores the importance of patient education and the role of maintenance therapy in ensuring long-term success. While root resection offers a viable alternative to tooth extraction, its success is highly dependent on several factors, including case selection, surgical technique, and post-operative care. Studies have consistently shown that root resection can be a predictable and effective treatment option when combined with regenerative procedures and proper maintenance. However, clinicians must carefully evaluate each case to determine whether the tooth is a suitable candidate for resection and ensure that the remaining roots can support the long-term function of the tooth.

CONCLUSION

Root resection remains a valuable tool in periodontal therapy, particularly for multi-rooted teeth affected by advanced periodontal disease. The procedure allows for the preservation of natural dentition while addressing the compromised root structure. When combined with regenerative materials such

as DFDBA and FDBA, root resection can lead to improved periodontal outcomes, with enhanced bone regeneration and long-term stability. Successful outcomes require careful case selection, meticulous surgical technique, and strict patient compliance with oral hygiene and maintenance therapy.

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