

# Saving a Natural Tooth in the Implant Era: A Case Report on Noninvasive Surgical Root Amputation

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## ABSTRACT

**Aim:** This report highlights the use of a seldom-used treatment modality to save a diseased multirooted tooth, as an alternative to extraction and implant.

**Background:** Root-resection therapy is a simple surgical procedure performed by an endodontist or periodontist to save a multirooted tooth with furcation involvement and/or defective root.

**Case description:** A 64-year-old female patient reported a strip perforation in the distobuccal (DB) root of the maxillary left first molar. The tooth had previously undergone endodontic treatment and had a well-fitted crown. After presenting the patient with treatment options and prognosis, a treatment plan of root amputation to save the tooth was formulated. A full mucoperiosteal flap was reflected. The DB root was amputated and GIC was placed to cover the root. Sutures were placed and the patient was given postoperative instructions. A follow-up was carried out with clinical examination, and periapical radiographs were taken at 10 months, 2 years, and 5 years after the procedure. The tooth was intact and functioning; no signs or symptoms were reported.

**Conclusion:** Root resection has a deserved place in the modern clinical management of endodontic lesions or injuries. Conventional conservative treatment plans can succeed with proper treatment planning, diagnosis, case selection, maintenance of oral hygiene, and meticulous follow-up.

**Clinical significance:** This case emphasizes a viable treatment procedure to manage teeth with compromised radicular or restorative presentations. Root resection is a venerable treatment option that is often ignored in the era of implants even though it shows favorable prognosis and success rates.

**Keywords:** Dental implant, Root amputation, Root-resection therapy, Survival of natural teeth.

*The Journal of Contemporary Dental Practice* (2021): 10.5005/jp-journals-10024-3152

## INTRODUCTION

Periodontal disease, dental caries, and trauma can lead to tooth loss across any age.<sup>1</sup> Multirooted teeth that show periodontal involvement can be saved by simple root-resection surgeries involving the crown and root, or root only. The ultimate aim is to retain the treated tooth in normal biological function. Root-resection therapy is a minor surgical procedure to remove the root/roots of multirooted teeth at the level of the cemento-enamel junction, without the removal of some portion of a crown.<sup>1</sup> It was earlier described as root amputation in 1884 by Farrar,<sup>2</sup> Gottlieb and Orban in 1933,<sup>3</sup> and Messinger and Orban in 1954.<sup>4</sup> Evidence shows that it is a valid treatment for multirooted teeth with furcation involvement.

Class III furcation involvement is the main indication for resective surgeries in multirooted teeth. Other indications include localized severe bone loss involving one root, vertical root fracture, root caries, persisting apical pathoses, deep class II furcation involvement, and iatrogenic root perforations.<sup>5,6</sup> A popular alternative treatment option is to extract the diseased tooth and place a dental implant in the place of natural dentition. The implant is a widely accepted and practiced treatment modality with a 10-year survival rate of approximately 96.4%.<sup>7</sup> However, "survival" is narrowly defined as the implant is present in the patient mouth at the time of recall examination.<sup>7</sup> There is a lack of evidence on the long-term survival of implants compared to natural teeth.<sup>8</sup> Implants have been known to present with their own complications, such as failures and peri-implantitis.<sup>9,10</sup> Research has shown that the number of teeth a person has is correlated to their perception of quality

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**How to cite this article:** Alkahtany M. Saving a Natural Tooth in the Implant Era: A Case Report on Noninvasive Surgical Root Amputation. *J Contemp Dent Pract* 2021;22(8):947–950.

**Source of support:** Nil

**Conflict of interest:** None

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of life.<sup>11</sup> This has stirred debate on preserving natural dentition vs implant replacement.<sup>12,13</sup> Many individual factors need to be considered with an unbiased and evidence-based understanding when planning for root-resection therapy. These factors include the patient's age, the prognosis of the procedure, oral hygiene, occlusal stresses, medical and dental health, compliance, and cost of the treatment. A 2019 systematic review and meta-analysis reported an overall good outcome for root resection (87.2%). The review highlighted the importance of systemic and dental health, economics, compliance, and patient preferences while formulating a treatment plan.<sup>14</sup> Treatment plans should be discussed thoroughly with patients based on their overall health condition, prognosis of the procedure, and compliance required for the treatment success. In this paper, we report on a patient, who chose root-resection therapy to save her tooth, considering her age, absence of any

major systemic disease, convenience, and cost. This report aims to present a viable treatment option of root-resection therapy for multirouted teeth that may seem dated in the implant era but has good prognosis with proper patient selection and management.

## CASE DESCRIPTION

A 64-year-old female patient reported to the postgraduate Endodontic clinic at the College of Dentistry, the University of Nebraska with a chief complaint of a swelling related to maxillary left first molar (#26). The medical history revealed that the patient suffered hypertension and arthritis. Her medications included lisinopril 40 mg and aspirin 90 mg, and her conditions were under control. On clinical examination, a slight swelling (05 x 05 mm) on the buccal cervical area of #26 was noticed. The swelling showed pus drainage through the buccal gingiva into the furcation area.

The patient had previously undergone root canal treatment for the tooth with a well-fitted full-coverage crown—porcelain fused to metal (PFM) crown. No caries were evident, and periodontal probing results were within normal limits around the tooth. Periapical radiographs were taken (Fig. 1) that revealed radiopaque evidence of endodontic treatment within the apical area. Two posts were present in the palatal and distobuccal (DB) canals. The radiograph revealed a strip perforation in the DB canal. The root appeared fractured and separated below the level of the furcation. Tooth #26 had a PFM crown with good margins. Based on the dental history and clinical and radiographic findings, the patient was diagnosed with strip perforation in the DB root of 26 that had previously undergone endodontic treatment.

## TREATMENT

The diagnosis was explained to the patient. The patient was presented with treatment options, prognosis, and cost of each procedure. Ultimately, the patient chose to save her natural tooth instead of extraction and implant/ fixed bridge placement.

Written informed consent for endodontic treatment consisting of root amputation of the DB root of #26 was reviewed and signed by the patient. On June 18, 2013, the patient was premedicated with 325 mg acetaminophen before the treatment was initiated. Local anesthesia was dispensed as 5% lidocaine topical anesthetic, two cartridges 4% articaine with 1:100,000 epinephrine local buccal and palatal infiltration. This was followed by one cartridge 2% lidocaine with 1:50,000 epinephrine given as local infiltration. A full-thickness mucoperiosteal flap was raised. Buccal cortical plate perforation was seen in between mesiobuccal and DB roots with the formation of granulation tissue. A crypt was made with a round bur fitted to a surgical handpiece. A strip perforation was visible on the DB root extending to the furcation area. The DB root was amputated, and glass ionomer cement was placed to cover the exposed post. Sutures were placed using 4-0 and 5-0 vicryl sutures. A postoperative radiograph was taken that showed the amputated root with GIC placed on the coronal part of the root (Fig. 2). Postoperative instructions were given verbally and also in a written form. The patient was advised to take 600 mg Ibuprofen every 6 hours to control the pain if needed. The patient was asked to return in 1 week for follow-up and suture removal.

After a week, the patient reported to the clinic with a history of slight swelling for 2 days after the surgery, which had disappeared. On clinical examination, normal soft tissue healing was observed.



Fig. 1: PA X-ray shows #26 with defective DB root



Fig. 2: Periapical radiograph shows #26 postoperatively with the distobuccal root amputated

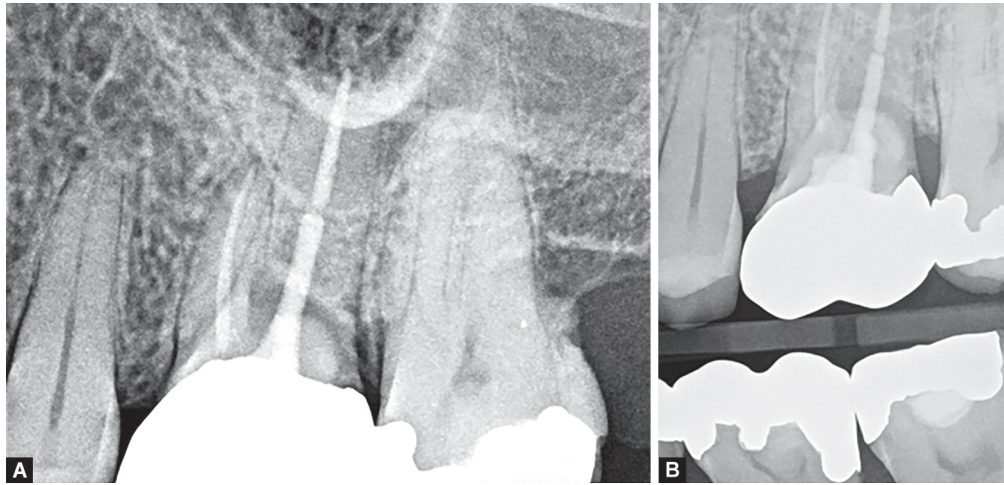
The sutures were removed, and the patient was scheduled for a recall visit after 6 months and after a year.

The patient visited the clinic for follow-up after 10 months (April 11, 2014) and reported no changes to her medical history and medications. There was no discomfort with tooth #26, probing WNL, and the patient reported no loss of chewing efficiency. We noted plaque accumulation in the DB area of #26. We advised and encouraged the patient to improve her oral hygiene measures. Periapical and bitewing radiographs revealed no abnormal changes and normal healing of the surrounding bone (Figs 3A and B).

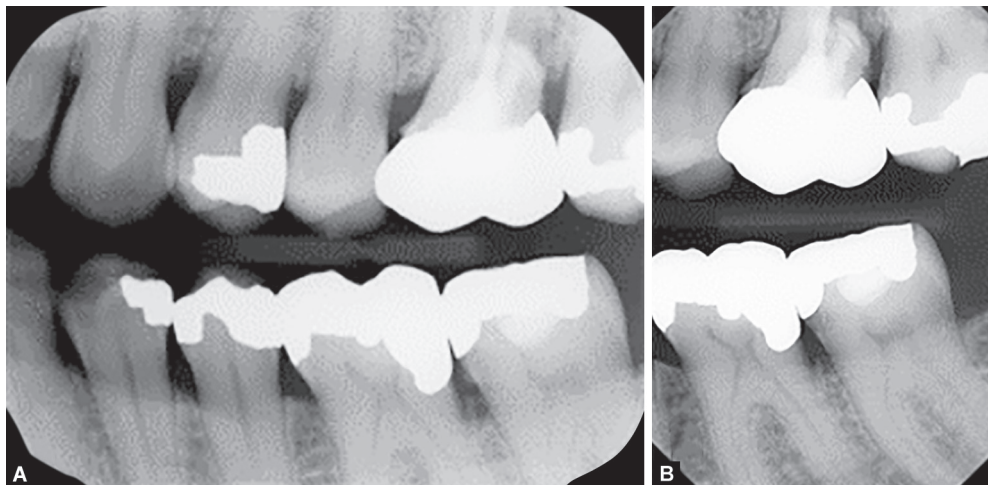
The patient reported for recall visits after 2 years (June 26, 2015) and after 5 years (May 31, 2018). On both occasions, bitewing radiographs were taken (Figs 4A and B) that showed no unfavorable changes. Clinically, the patient had good oral hygiene and the tooth appeared to be functioning normally.

## DISCUSSION

Ingle, in his seminal textbook, emphasized the need to save a tooth by stating “pull and be damned”. He meant that the clinician should do everything in his power to save the natural dentition.



**Figs 3A and B:** Ten months recall (A) Periapical radiograph; (B) Bitewing radiograph showing #26 with good healing



**Figs 4A and B:** Bitewing radiograph taken at follow-up at (A) 2 years; (B) 5 years. Both bitewing radiographs show #26 with no abnormal changes and good healing

Endodontists can perform minimally invasive apical surgeries in apicoectomy cases using dental operative microscopy. This involves the removal of a small portion of the tip of the root. Root-resection therapy is used when the removal of the entire root is indicated.<sup>15</sup> Root-resection therapy is an alternative to costly implants that can help reduce probing depth, eliminate furcation defects, and improve access for oral hygiene measures.<sup>16</sup> It is a treatment option that saves the natural dentition and is far more economical than dental implants that can only simulate the dentition.

The gold standard for replacing a tooth is a dental implant. However, extraction should be the last resort to be considered, provided there are other treatment alternatives, rather than the treatment of choice to replace a person's existing tooth.<sup>12,13</sup> It is important to discuss other viable treatment options with the patient during treatment planning to educate the patient so that they can make an informed decision. Earlier research has shown that root-resection therapy can provide predictable and reliable positive outcomes and should be considered a valid treatment

option for patients.<sup>14</sup> One of the main issues to be emphasized for patients undergoing root-resection therapy is the continued maintenance of excellent oral hygiene. The root-resection surgery can create undercuts below the crown. Regular home care and maintenance followed by regular dental visits for oral hygiene are crucial for treatment success.<sup>17</sup> To ensure long-term survival, a multidisciplinary approach is required in order to bring occlusal balance and functional harmony after root resection.<sup>18</sup>

The importance of this case report is not based on the novelty of the technique. Previous reports and analysis have shown that root-resection therapy when combined with proper patient selection and meticulous follow-up can result in good outcomes.<sup>19-23</sup>

We aimed to shed light on a timeworn treatment modality that has been all but abandoned in the era of the implant. The treatment plan was formulated and followed based on the patient's preferences and was supported by research that reported excellent outcomes for root-resection surgeries for a 3-5 years period.<sup>24</sup> Retrospective studies have shown that the mean survival time can

range up to 20 years or more.<sup>20</sup> The case described here shows excellent stability of 5 years postsurgery. The patient is completely satisfied with her decision to save her natural dentition and the cost of the treatment and the results.

There is a lack of clinical trial data regarding the effectiveness of root-resection therapy as prospective randomized controlled trials are difficult to design due to the nature of the procedure—root-resection therapy is often the last resort to save a natural tooth.<sup>14</sup> Evidence-based dentistry, as defined by the American Dental Association, stresses the importance of integrating the patient's needs with clinically relevant evidence and operators' skills for a successful treatment outcome.<sup>25</sup> Through this lens, it is obvious that root-resection therapy is a viable alternative to extraction.

## CONCLUSION

In this case report, we discussed the management and treatment of an endodontically treated maxillary first molar with a damaged DB root through root-resection therapy. After 5 years of follow-up, we can confidently state that the procedure was a complete success and the results are stable. The success of root-resection therapy is predicated on proper case selection, diagnosis, excellent technique, patient's health, regular follow-up, and compliance. Root-resection therapy remains a valid treatment option for teeth that present with radicular and periodontal problems.

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