

## Root Resection & Bone Grafting of Fractured Mesiobuccal Root of Maxillary First Molar: an Interdisciplinary Approach.

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**Abstract:** A case is reported documenting the successful treatment of fractured mesiobuccal root of a maxillary left first molar with pain and swelling. The root canal treated tooth was treated along with root amputation and bone grafting of mesiobuccal root followed by prosthetic treatment.

**Key Words:** Root amputation, Root fracture, Hemisection, Mesio-buccal root.

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### I. Introduction

Root resection is a surgical procedure by which one or more roots of multirooted teeth are removed at the level of the furcation whilst the crown and remaining roots are left in function.<sup>1</sup> The procedure of root resection was first introduced by Farrar in 1884.<sup>2</sup> It is synonymous with root amputation. This is in contrast to hemisection which removes the affected root of the involved tooth and the contiguous crown portion.

Treatment planning for resection encompasses a multidisciplinary approach that includes periodontic, endodontic, and restorative considerations to the tooth being treated.<sup>3</sup> Failure to inadequately manage any of these areas may lead to tooth loss.

Root resection procedure has been performed in dentistry since the late 1800s<sup>3</sup>. With proper long-term monitoring and maintenance, root resection procedure is accepted as valid treatment with the reasonable long-term effectiveness.<sup>4</sup> Root-resection procedure is a treatment option for molars with periodontal, endodontic, restorative or prosthetic problems.<sup>5</sup>

### II. Case Report

A 39-year-old patient reported to the Department of Periodontics, at Coorg Institute of Dental Sciences, Virajpet, Kodagu district with the complaint of throbbing pain in the upper left posterior region of jaw since 2-3 months. The patient gave a history of swelling with respect to maxillary first molar {#26}. The patient's medical history was non-contributory. On taking a detailed history patient explained about a fracture of the zygomatic bone on the left side 8 years back.

He had swelling and infection-related #26. Endodontic treatment plan consisted of Root canal treatment and a course of antibiotics was prescribed. Palpation and Percussion were positive for tooth #26 with the absence of periodontal pockets. Radiographic evaluation (fig -1) of tooth #26 revealed a well-defined periapical lesion and vertical fracture on the mesiobuccal root.



**Fig-1**

The patient was given the option of extracting the tooth followed by an implant due to the poor prognosis. But the patient was keen on retaining the natural tooth hence refused extraction. The decision was made to do a root amputation of the mesiobuccal root. The patient was informed about the questionable prognosis and the patient agreed and signed a consent form for the procedure.

A vertical incision was made mesial to tooth #25 with #15 blade. An intrasulcular incision was made from tooth #26 to tooth #27. The mucoperiosteal flap was elevated and the fracture located at the middle of the mesiobuccal root was noticed. Based on the clinical finding, the diagnosis of root fracture was confirmed and the mesiobuccal root of tooth #26 was resected at the level of the crown margin with a straight diamond bur using saline irrigation. A radiograph was taken and ensured that the entire root was resected (fig -2). The cervical part of the crown was reshaped at the area of the mesiobuccal root to prevent food impaction. The sectioned area was then evaluated using a fine explorer. Bony spicules were trimmed from the furcation area and it was inspected for any periodontal irritation. Glass ionomer cement (Fuji IX, GC, Europe), was used to seal the pulp chamber at the furcation area (fig-3).



**Fig – 2**



**Fig – 3**

Biogran (BIOMET 3i, Palm Beach Gardens, FL, USA) was gently packed into the defect. A resorbable collagen membrane (Cytoplast, RTM collagen; Osteogenics Biomedical, Lubbock, TX, USA) was placed over the graft material. The flap was repositioned and secured with 4-0 Vicryl double sutures (Johnson and Johnson Health Care Systems Inc. NJ, USA) (Fig. 4).



**Fig – 4**

The patient was instructed to avoid the use of the operated side for a few days, to have soft, lukewarm semi-solid diet and to rinse the mouth daily with 0.2% w/v chlorhexidine gluconate twice a day till further instructions. The patient was put on a dose of Amoxicilin 500 mg thrice daily, Metronidazole 400 mg thrice daily and Ibuprofen 400 mg thrice daily for 7 days. The patient came for re-evaluation after 7 days and the healing was found to be satisfactory. The patient was evaluated periodically for prognosis and Post Endodontic Restoration was given.

### **III. Discussion**

Root resection can be considered when there is no periapical resolution of infection following root canal treatment<sup>7</sup>, as this procedure often eliminates the infection source. In cases with vertical root fracture, root resection can eliminate the fractured root and provide an area favourable for good oral hygiene.<sup>8</sup>

The prognosis of non-surgical and surgical endodontic treatment decreases in cases of root fracture.<sup>8,10</sup> Root amputation can be indicated in cases of multi-rooted teeth when an implant is not feasible to extend the functionality of the remaining tooth structure.<sup>11</sup> Several studies have evaluated the long-term success of root-resected teeth. The failure rate of root amputation in molars has been reported to range from 25% to 38%.<sup>12,13</sup>

The long-term prognosis depends on the quality of the performed surgery, recontouring of the remaining tooth structure as well as the status of periodontal care. The quality of root canal treatment in the remaining roots and final restoration should be considered too.<sup>14-17</sup>

Molars with amputated roots showed the highest degree of failure when they served as long-standing terminal abutments. It has been reported that molars with the bone support of more than 50% of the remaining roots at the time of root resection had a significantly higher survival rate as compared to that of molars with less than 50% bone support. In the case, there was palatal bone intact with no mesial or distal root furcation involvement, which provided a more favourable prognosis. Good post-operative oral hygiene is important, especially in areas of root resection. Occlusion should be evaluated, and the root resected tooth should receive full coverage if not already present to prevent a vertical root fracture, which is one of the most common complications following a root amputation procedure.<sup>18</sup>

Antibiotics were prescribed in both cases because the patients exhibited signs of clinical infection, and GTR was anticipated along with root resection. Clinical infection is defined as increased pain, localized swelling, tenderness, redness and heat.<sup>19</sup> Inflamed gingival tissue is one of the negative factors influencing GTR outcomes.<sup>20</sup> Therefore, antibiotics were given before surgery. Antibiotics and chlorhexidine were prescribed after surgery as well. Ample evidence exists to suggest an association between infection and suboptimal regenerative outcomes<sup>20,21</sup>. Systemic antibiotics have also been shown to improve regenerative outcomes<sup>22</sup>. Periodontal surgery using chlorhexidine during post-operative care showed a lower infection rate<sup>23</sup>. The length of prescription was determined based on the severity of pain and infection, history of illness, surgical extension and patient's medical history. Oral infections require an average of 5–7 days of therapy but in cases of severe infections or lowered host resistance, a longer duration may be required to avoid failure of antibiotic administration<sup>24</sup>.

Guided tissue regeneration procedures were performed after the root resection to prevent future furcation involvement and to facilitate the healing and regeneration of apical bone. An animal study<sup>25</sup> showed that the use of a bioresorbable membrane enhanced the regeneration of apical bone, connective tissue attachment and marginal alveolar bone. A human study<sup>26</sup> reported GTR treatment yielded good results in terms of periapical and periodontal healing.

The bioactive glass was used as a bone graft material in these cases. Bioactive glass is a biocompatible, alloplastic material with osteoconductive and osteoinductive properties.<sup>27</sup> It was suggested that a biologically active hydrated calcium layer may form at the surface of the glass particles, and this may result in a bond between these particles and the soft tissues and bone of the host.<sup>28</sup> It was also postulated that bioactive glass might provide a scaffold for bone deposition.<sup>29</sup> Clinically, the bioactive glass was easy to handle, strongly adherent, packed well into the defect, appeared to harden as a solid after it was packed and facilitated the surgical procedure by improving haemostasis.<sup>30</sup>

In cases such as these, occlusion must be evaluated carefully, and crowns must be placed on teeth to prevent a vertical root fracture, which is one of the most common complications observed following a root resection procedures.<sup>31</sup>

#### **IV. Conclusion**

Procedures like root resection and hemisection can save compromised teeth for longer periods and are comparatively less expensive. The prognosis for root resection is the same as for routine endodontic procedures provided that case selection has been correct, the endodontic treatment has been performed adequately, and the restoration is of an acceptable design relative to the occlusal and periodontal needs of the patient.

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