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# Platelet Rich Fibrin & Guided Tissue Regeneration Aided Coverage of a Mucosal Fenestration – An Interdisciplinary Approach

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## ABSTRACT

**Aim:** Mucosal fenestrations affecting permanent teeth are clinically challenging because they require a more complex approach. The objective of this case report was to describe a treatment modality used to manage an apical fenestration placed on the left mandibular central incisor root.

**Case Report:** The case report describes the management of a patient with mucosal fenestration of root apex. Mucosal fenestration of root apex was treated by a combination of root canal treatment and surgery. Root-end resection was performed to bring the root apex within the alveolus before root-end filling and packing of the bony defects with platelet rich fibrin. The dehiscence of the buccal labial plate was managed by placement of a barrier membrane. The edges of the soft tissue defect was then de-epithelialized, approximated and sutured.

**Discussion:** Various treatment modalities advocated in the literature for the management of mucosal fenestration include- root canal treatment and root-end resection, blind root surface instrumentation and mouth rinsing with chlorhexidine, full thickness mucogingival flap with primary or secondary healing, pedicle flap operations, epithelialized and non-epithelialized grafting procedures for root coverage and full thickness mucogingival flaps with guided tissue regeneration and bone grafting.

**Conclusion:** The endodontic and periodontal surgical techniques used in the management of alveolar or mucosal fenestrations alone are unremarkable but combining them can give optimum outcome.

**Key Words:** Platelet rich fibrin, Mucosal fenestration, GT

## INTRODUCTION

The relationship between the alveolar bone and the teeth have been dated back to 1963, when O'Connor studied the relationship of teeth with the tooth anatomy, inter-proximal bone, bony wedges and the presence of fenestrations.<sup>1</sup> Fenestrations and dehiscences, are being more considered normal variations with regard to presence of the teeth, than pathologic conditions. The criteria for their identification as put forth by **Davies RM *et al***<sup>2</sup>. as dehiscence is a lack of cortical bone at the level of the root of the tooth, at least 4 mm apical to the margin of the inter-proximal bone; whereas fenestration is a contained defect of the alveolar bone that exposes

the apical or the middle third of the root surface, without involving the marginal bone.

A precise and seldom encountered spectacle is a combination of apical fenestration along with a mucosal fenestration. Mucosal or apical fenestration is termed as a pathologic condition which is characterized by the perforation of the cortical plate and the overlying mucosa by the prominent roots of teeth. It was first described in literature as “bone fenestration by roots of deciduous teeth” by **Mene'ndezi 1967**<sup>3</sup>. Mucosal fenestration may be attributed to decreased thickness of the alveolar housing, labioversion of the tooth in the dental arch, contour of the root apex, occlusal factors, ortho-

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dontic tooth movement, periodontal and endodontic pathology and aberrant frenal attachment.<sup>4,5,6</sup>

Mucosal fenestration is most frequently found in the mandibular or maxillary anterior teeth region, particularly on the labial aspect because of tooth angulation that places the root apices in alabial version. Mucosal fenestrations have been reported in literature but are far less prevalent as compared to normal fenestration perhaps due to symptom free nature.<sup>7</sup> Even though they are usually symptom-free, they might act as plaque-retaining areas, resulting in irritation and inflammation of the surrounding mucosa.<sup>8</sup>

Mucosal fenestrations affecting permanent teeth are clinically challenging because they require a more complex approach. The aim of this case report was to represent a treatment modality used to manage an apical fenestration occurred on root surface of the left mandibular central incisor.

## CASE REPORT

A 26-year-old male patient reported to the OPD of JSS Dental College and Hospital, Mysore with discoloured lower front tooth. Patient gave a history of trauma 1 year back, following which there was a progressive discoloration of the tooth with intermittent pus discharge. Patient was in good health. No pathologic signs were evident through facial inspection. Oral examination revealed the apical third of the root of 31 that perforated the buccal cortical plate and adjacent alveolar mucosa, being therefore exposed to the oral environment and the discoloured crown of the same tooth. [Fig:1]



Figure 1: Preoperative view.

There was presence of plaque, calculus and soft debris on the exposed root tip and the margins of the surrounding mucosa were inflamed and tender. The tooth was grade 1 mobile. Pretreatment radiograph revealed discontinuity in the lamina dura around the apex of the 31 with periapical radiolucency [Fig:2]. Also, the tooth was nonvital. The probing depth measured 2mm buccally and 1.5 mm lingually hence, diagnosis of asymptomatic chronic apical periodontitis with mucosal fenestration on tooth 31 was made.



Figure 2: Preoperative radiograph.

## TREATMENT

After phase 1 therapy consisting of scaling and root planing, multivisit endodontic treatment was performed. Following working length determination, biomechanical preparation was done using K-file and recapitulation with 5.25% sodium hypochlorite. Calcium hydroxide paste was used as intracanal medicament for 10 days. Next appointment, calcium hydroxide paste was removed and root canal was obturated with cold lateral condensation of gutta percha with zinc oxide eugenol as sealant. Surgery was undertaken 2 weeks after endodontic treatment. Fibre reinforced composite splinting was done in relation to 41,31 and 32. Region 31,32,41,42 was anaesthetized with 2% lignocaine. Crevicular and vertical releasing incisions were made, and full-thickness flap was raised, revealing dehiscence of the buccal cortical bone along the root surface of 31 [Fig:3]



Figure 3: After reflection showing the periapical defect.



Granulation tissue was immediately apparent surrounding the root apex. Curettage of this tissue revealed the extent of bone loss. The prominent portion of the affected root apex was resected.

The resection was carried up to the level of remaining sound alveolar bone, so that the root margins were flush with the surrounding bone to reposition the affected root in the alveolar housing [Fig. 4a,b].

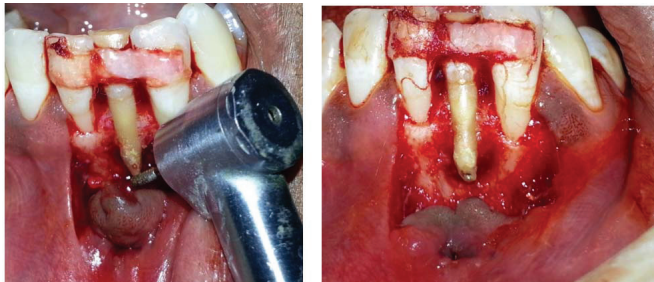


Figure 4(a, b): Apicoectomy.

Any remaining granulation tissue was removed. The root planning was done and then glass ionomer cement(GC Fuji II; GC America, Alsip, IL)was placed over the prepared root end.[Fig: 5]



Figure 5: Root end filling done with GIC.

Autologous graft (platelet rich fibrin) was obtained from the patient and placed in the defect at the periapical region of 31. The root was then covered with GTR membrane (Healigide). [Fig:6,7]



Figure 6: PRF prepared.

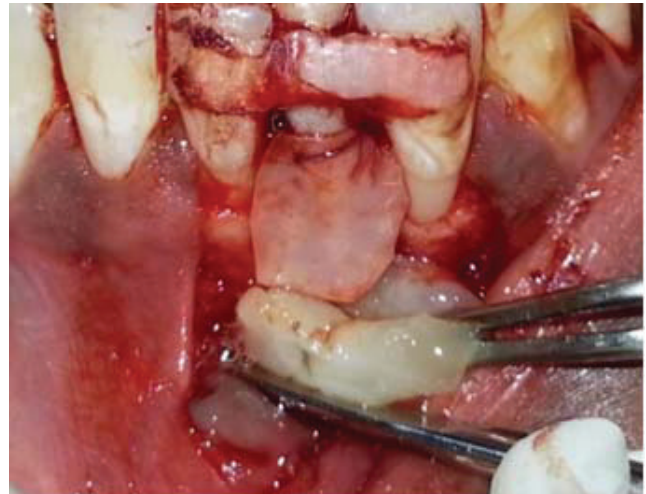


Figure 7: Placement of PRF in defect and covered with GTR membrane.

The edge of the mucosal defect was de-epithelialized, approximated and sutured with resorbable sutures to ensure closure [Fig:8]. The wound was covered with periodontal dressing(coe-pak)



Figure 8: After suturing.

Post-operative instructions were given and antibiotics and analgesics were prescribed.

Patient was recalled after 1 week for removal of the pack. Patient was without any local complications and free of symptoms. The 2 and 5 months recall showed excellent soft tissue healing [Fig:9a ,b]



Figure 9(a, b): Post-operative 2 months and 5 months.

Periapical radiograph revealed well performed endodontic treatment, healing and remodelling of the apical area at 6 months recall [Fig:10]. A two year follow-up period with every 6 months radiographic evaluation was recommended.



Figure 10: Six months post-operative IOPAR.

## DISCUSSION

Mucosal fenestration is a relatively uncommon complication of pulpo-peri radicular disease.<sup>9,10,11</sup> The exact aetiology is unknown but review of literature suggests that abnormally labioversed root tips, very thin labial plates and the presence of chronic periapical inflammation may be the probable cause. The first step toward management of mucosal fenestrations is identifying the precipitating cause of its oc-

currence. In this case, trauma could be the primary etiologic factor, along with prominent root positions and chronic periapical inflammation that might have destroyed the overlying thin facial cortex and mucosa. Mucosal breakdown and exposure of the root tip to the oral cavity leaves the root-tip vulnerable to plaque accumulation and calculus formation which prevents the reformation of mucosal covering.

Various treatment modalities advocated in the literature for the management of mucosal fenestration include- root canal treatment and root-end resection,<sup>8,9</sup> blind root surface instrumentation and mouth rinsing with chlorhexidine<sup>10</sup>, full thickness mucogingival flap with primary<sup>11</sup> or secondary healing<sup>12</sup>, pedicle flap operations<sup>4</sup>, epithelialized and non-epithelialized grafting procedures for root coverage and full thickness mucogingival flaps with guided tissue regeneration and bone grafting<sup>13</sup>.

In this case, since the tooth was non vital, it was first treated by root canal therapy to eliminate the focus of infection. Healing of the mucosa was then aided by removal of the granulation tissue, root end resection, and removal of adjacent infected cementum by root planning. The main objective of resection of the abnormally prominent root apices about the level of remaining sound alveolar bone is to return the root within the bony limit of the cortex. This affords a favourable anatomic configuration and eliminates future risk of irritation. Glass ionomer cement was used to achieve a good apical seal after proper isolation. **Jhaveri et al**<sup>14</sup> have reported light cure GIC to be a successful root end filling material.

In the present case, after flap elevation dehiscence of the labial cortical plate was seen. Hence an attempt to regenerate the periodontal supporting tissues was made utilizing the principles of guided tissue regeneration. GTR was used in our case not only as a root coverage procedure, but also as a strategy of endodontic surgery where the ultimate goal was to regenerate the attachment apparatus.

Scientific evidence indicates that principles of GTR can be successfully applied in endodontic surgery to correct alveolar bone defects confined to periapical region. Animal histological studies showed that complete bone filling of periapical bone cavities occurred after endodontic surgery only when a barrier for guided tissue regeneration was used, whereas extensive connective tissue filling of the defects was found after conventional endodontic surgery.

The present case is unique in that it is the first case to utilize platelet rich fibrin (PRF) as a grafting material. The three crucial factors for healing and soft tissue maturation are angiogenesis, growth factors and mesenchymal stem cell activity. PRF consists of a fibrin 3D mesh polymerized in a specific structure, incorporating platelets, leucocytes, growth factors and circulating stem cells.<sup>17</sup> The concentrations of growth



factors within the platelet concentrate up regulate cellular activity and subsequently promote periodontal regeneration in vivo. Fibrin, fibronectin, platelet derived growth factor (PDGF), vascular endothelial growth factor (VEGF) and transforming growth factor beta (TGF- $\beta$ ) in PRF aid in angiogenesis, tissue repair and regeneration.<sup>18</sup> Hence owing to these advantages PRF was used as an effective biomaterial as projected in this case.

## CONCLUSION

The endodontic and periodontal surgical techniques used in the management of alveolar or mucosal fenestrations alone are unremarkable but combining them can give optimum outcome. Guided tissue regeneration in combination with platelet rich fibrin can successfully be used to treat fenestrated root apices.

### Abbreviations:

GTR: guided tissue regeneration  
 GIC: glass ionomer cement  
 PRF: platelet rich fibrin  
 PDGF: platelet derived growth factor  
 VEGF: vascular endothelial growth factor  
 TGF- $\beta$ : transforming growth factor beta

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