CASE REPORT

# MANAGEMENT OF PERIAPICAL FENESTRATION-INTERDISCIPLINARY APPROACH

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## Abstract

Mucosal fenestrations are rarely encountered in clinical practice, and as such their management is not reported often. Their treatment might be further complicated due to a communication with the oral environment, making them more susceptible to accumulation of debris, plaque and calculus thereby reducing the probability of mucosal renewal. The aim of the present case report is to highlight one such rare clinical scenario and its apt and effective management.

**Summary:** Various treatment modalities are available for root exposure defects. Surgical management of an uncommon presentation of concomitant gingival recession with an isolated mucosal fenestration in an atypical location, with an allograft matrix is presented here with two years follow up. A review of literature revealsno previous application of AlloDerm graft for the management of a similar situation.

Key Words AlloDerm, coronally positioned flap, gingival recession, mucosal fenestration, root coverage.

## INTRODUCTION

The desire for cosmetic dentistry and enhanced aesthetics hasincreased tremendously in contemporary society. Cosmetic procedures have become an integral part of periodontal treatment. Aesthetics is compromised in patients with clinical root exposure which can be attributed to various reasons such as gingival recession, fenestration/dehiscence etc. Recession defects are treated to resolve a variety of patient-centered concerns including aesthetics, root sensitivity, increased potential for root caries, difficulty in plaque control[1]. Furthermore, it must be remembered that exposed roots are more prone to abrasion and erosion. The rationale for procedures involving root coverage is to achieve a stable function of the periodontium and esthetically satisfying gingiva.[2] Over the past few years, multiple surgical techniques have been employed in obtaining effective root coverage such as: pedicle grafts, autogenous free gingival grafts, connective tissue grafts (CTG) combined with pedicle grafts, guided tissue regeneration and acellular dermal matrix (ADMA).[3]

ALLODERM (LifeCell), an acellular dermal matrix is derived from donated human skin tissue supplied by tissue banks in the United States utilizing American Association of Tissue Banks standards and FDA guidelines. AlloDerm offers significant advantages over freeze dried skin allografts[4]. Following its first usage in managing burns in 1992,[5] it was used as a safe and effective means for moderation of lips for plastic surgery,6and was also

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successful as a substitute to autologous split thickness skin graft for resurfacing of intraoral defects.[7] Subsequently, it was introduced to periodontal surgery in 1994[8] as an alternative to autogenous free gingival graft or connective tissue graft for root coverage. It was also used for increasing keratinized gingiva around natural teeth or implants,[9] for increasing vestibular depth,[10] for treatment of amalgam tattoo,[11] for ridge preservation procedures[12] and for covering submerged implants immediately following insertion into fresh extraction sockets.[13] Based on several case reports in oral surgery, periodontal surgery and plastic surgery,[14,15] it has been observed that ADMA consistently integrates into the host where it revascularizes via preserved vascular channels and maintains the structural integrity of the tissue.[16] ADMA heals by repopulation and revascularization rather than through a granulation process maturing to scar.[17]

Several case studies have been reported that Acellular dermal matrix when used for root coverage procedures, the results are comparable or better than that of subepithelial connective tissue graft.[18,19,20,21] However, CTG results in greater gain of keratinized gingiva significantly than AlloDerm.[22,23] Despite that, AlloDerm has several advantages over CTG or free gingival graft like elimination of the palatal donor site, unlimited supply of tissue, excellent color match, uniform thickness and is also useful in patients with shallow palate. Its disadvantages are increased shrinkage and cost.[8]

The following case report describes a rare clinical scenario of an isolated apical soft tissue fenestration with concomitant localized gingival recession in relation to the maxillary canine which was surgically corrected by placement of AlloDerm matrix resulting in successful closure of the defects with 2 years follow up period.

## CASE REPORT

A male patient aged 27 years, cameto the Department of Periodontics, Manipal College Of Dental Sciences, Manipal, India, with the chief complaint of receded gums in relation to the upper left canine causing an aesthetic concern. The patient had undergone root canal treatment followed by periapical surgery in relation to 23, four years agowhich was asymptomatic. In addition to which, he had undergone orthodontic treatment for his labioverted anterior teeth two years back. The patient's medical history was noncontributory. On intraoral examination, the patient presented with good oral hygiene. The periodontal status of other teeth were normal. The gingiva in relation to 23 was erythematous with grade I (Silness and Loe) bleeding and was edematous in consistency. The tooth exhibitedMiller's class II gingival recession along with an isolated root apex exposure with mucosal fenestration (Fig. 1A). The tooth was also labioverted, nontenderon percussion and showed physiologic mobility. Radiographic examination revealed obturated 23 along with a slight radiopaque retrograde filling indicative of an eroded silver amalgam at the root end. During the first appointment, oral prophylaxis was performed and the patient was referred to the Department Of Endodontics, Manipal College Of Dental Sciences, Manipal, India, to seek an opinion regarding the integrity and status of root canal treated 23. Ideally, the preferred line of management is re-intervention of root canal treated 23 in an orthograde manner followed by periapical curettage and replacement of root end filling material. As the patient was unwilling and asymptomatic, plastic periodontal surgical procedures following only replacement of the root end filling was proposed. Clinical parameters such as gingival recession, probing depth, width of keratinized gingiva were assessed and various treatment options regarding the closure of the defects were explained to the patient. The gingival defects were planned to be treated with either a connective tissue graft(CTG) or AlloDerm. Since the patient was apprehensive about obtaining CTG from the palate and compromising his healthy tissues, a coronal flap re-positioning along with the placement of AlloDerm matrix was preferred.

## SURGICAL PROCEDURE

The surgical site was anaesthetized with 2% lignocaine with 1: 1,00000 adrenaline. (LIGNOX 2%A, INDOCO REMEDIES LTD). Two horizontal incisions were given at the level of the CEJ in relation to 23extending slightly beyond the midpoint of the interdental papilla followed by two vertical incisions beyond themuco-gingival junction (Fig. 1B). A split full-thickness flap was elevated exposing theapical portion of the root. Root surface debridement was done followed by complete debridement of theperiapical region, removing the granulation tissue. Following debridement, the apical portion of the root was completely visible with the residual retrograde amalgam filling (Fig. 1C).Rough serrated margins of the root were smoothened followed by replacement of the root end fillingwith light-cured glass ionomer (GC Fuji II LC; GC America, Alsip IL)cement (Fig. 2A).

**Rehydration of AlloDerm and its placement into the defect:**

Following aseptic removal of AlloDerm from the pouch, a sufficient dimension of the required graft material was aseptically rehydratedprior to its use for about 20 minutes as recommended by the manufacturers. The AlloDerm with the attached backing was placed in a sterile petridish containing 50 ml of rehydration fluid(0.9% normal saline). As the backing might floataway from the tissue, it was

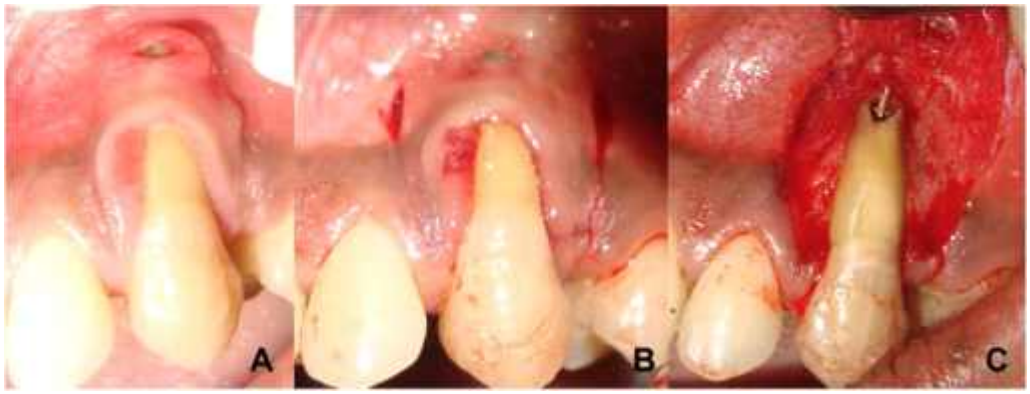


**Figure. 1:**

**Fig1. A** - Preoperative view of mucosal fenestration associated with localized gingival recession in relation to 23.

**Fig1. B** - A Split full thickness flap was elevated in relation to 23.

**Fig1. C** - Exposure of the root apex following flap reflection and removal of old root end filling material.

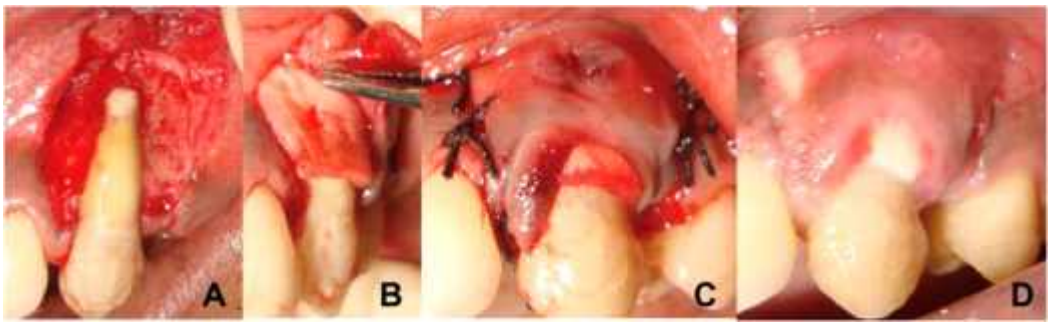


**Figure. 2:**

**Fig2. A**- Complete periradicular debridement done in relation to 23 along with placement of light-cured glass ionomer cement as a root end filling.

**Fig2. B**- Placement of AlloDerm matrix into the fenestration defect.

**Fig2. C**- Approximation of the flap following placement of the AlloDerm.

**Fig2. D**- ExposedAlloDerm appeared white in colour following two weeks.

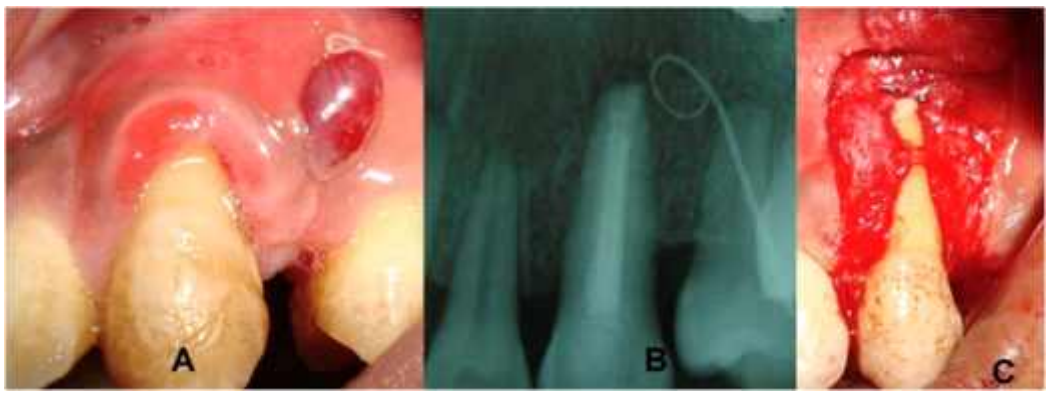


**Figure. 3:**

**Fig3. A** - Complete closure of the soft tissue fenestration associated with swelling in the interdental region of 23 and 24 following nine months after the first surgical procedure.

**Fig3. B** - Sinus traced with gutta-percha (ISO Size 25/.02 taper) leading to the periapex of 23.

**Fig3. C** - Formation of new connective tissue in response to the placement of AlloDerm matrix.

**Figure. 4 -** Six months follow up

**Figure. 5 -** Two years follow up with complete closure of the mucosal fenestration and gingival recession.

carefully removed and discarded. Then the AlloDerm was aseptically transferred to another sterile petri-dish containing 50 ml of rehydration fluid for further hydration. The fully rehydrated graft containing a basement membrane side and a connective tissue side was then ready for application to the wound bed. The graft was oriented with the basement membrane side towards the flap and the connective tissue side towards the periosteal bed (Fig.2B ). Firm pressure was applied on the graft with a sterile moistgauze pack for few minutes facilitating proper adaptation of the graft. It was then secured with 4-0vicryl sutures (Coated VICRYLTM Polyglactin 910, ETHICON, Johnson and Johnson, New Brunswick, NJ). Before suturing the flap, a thin band of epithelium around the soft tissue defect was removed andit was sutured over the AlloDerm with 3-0 black silk sutures (PERMA-HANDTMSilk Sutures, ETHICON, Johnson and Johnson PVT LTD, New Brunswick, NJ) by vertical mattressing and sling suturing technique (Fig. 2C) followed by placement of a periodontal pack. (COE-PACKTM, GC America, Alsip, IL). Antibiotic, Amoxicillin 500 mg (Cap IDIMOXTM, IDPL) one capsule three times a day for 5 days and analgesic, ibuprofen and paracetomol combination (TAB COMBIFLAMTM Sanofi Aventis Pharma) one tablet three times a day for 3 days was prescribed, after which, post-operative instructions were given. The patient was advised chlorhexidine mouth wash 0.2% (Hexidine, ICPA health products) and review after two weeks, when the sutures were removed. The patient was asymptomatic and healing was uneventful. The apical portion of the root in relation to 23 was completely healed without any fenestration. There was only a limited exposure of the root surface at the cervical aspect. The exposed AlloDerm appeared white in colour. (Fig. 2D).The periodontal dressing was repeated followed by post-operative instructions and the patient was recalled after one week. However, the patient failed to report back after a week. Here ported to the clinic after nine months with a complaint of residual root exposure and swelling associated with a sinus opening in the interdental region of 23 and 24 (Fig. 3A). The sinus was traced with a gutta-percha: #25, ISO C120, .02 taper (LEXICON, DENTSPLY, TULSA Dental Dealers, Tulsa, OK) which lead to the periapex of 23 (Fig. 3B). However, there was an increase in the thickness ofkeratinized gingiva along with an almost complete closure of the soft tissue fenestration (Fig.3A). A periapical curettage followed by a modifiedcoronally positioned flap to ensure complete closure of the residual root exposure, was done. Flap reflection revealed connective tissue formation in response to the placement of AlloDerm(Fig. 3C) The granulation tissue was completely debrided and the flap was closed with 3-0 black silk sutures (PERMA-HANDTM Silk Sutures, ETHICON, Johnson and Johnson, New Brunswick, NJ) using simple interrupted suturing and sling suturing techniques. A periodontal dressing was given followed by postoperative instructions and prescription of antibiotics and analgesics. The patient was advised to report to clinic regularly for periodic follow up.

**Six months follow up:**

The patient was reviewed after 6 months. The patient was asymptomatic. There was a complete blending of the AlloDerm with the surrounding tissues with no exposure of residual graft in the surgical site (Fig. 4). Surgical re-entrywas done to evaluate the connective tissue formation which revealed that, the portion of the fenestration defect following placement of AlloDerm was adequately covered with a new connective tissue with a gradual increase in its thickness.The flap was then placed as coronally as possible with passive repositioning with an intention of covering the residual defect at the cervical aspect, following which, 3-0 black silk sutures were placed. The patient reported to the clinic after a week and the sutures were removed. Healing of the surgical site was uneventful. Periodic review was done.

**Two years follow up:**

Two years postoperative visit revealed that the

patient was asymptomatic anddid not show any clinical signs of recurrence of the fenestration and gingival recession. There was almost complete coverage of the root with asignificant increase in the width of keratinized gingiva, in addition to, the absence of any pathological probing depth. (Fig. 5)

## DISCUSSION

The morphological features of the bone are altered during periodontal disease with various osseous defects having been reported in dental literature. Two commonly encountered alveolar defects are dehiscence and fenestration.[24] An alveolar dehiscence denotes a lack of facial or lingual cortical plate resulting in a denuded root surface, while alveolar fenestration is a circumscribed defect of the cortical plate, which expose the underlying root surface, without involving the alveolar margin.[25] Fenestration is an isolated area in which the tooth is denuded of bone and is covered only by the periosteum with an overlying gingiva. Mucosal /gingival fenestration is a clinical entity in which the overlying mucosa or gingiva is also denuded, thus exposing the root to the oral cavity. It seems to have a multifactorial origin with relation to decreased thickening of the alveolar housing, labioversion of the tooth in the dental arch, contour of the root apex, orthodontic tooth movement, occlusal factors, periodontal and endodontic pathology, and aberrant frenal attachment[26]. Gingival fenestrations are not common and are rarely encountered in clinical practice than dehiscence. It was first reported by Menedez OR in 1967[27] and is usually reported in the anterior region, particularly incisors. It is considered as an uncommon complication of pulpo-periradicular pathosis[28]. On the contrary, gingival recession is a common clinical condition encountered in regular practice which may be attributed to various etiological factors such as periodontal disease, improper oral hygiene, frenal pull, bone dehiscence, improper restorations, tooth malposition, viral infections of the gingiva, and oral habits[29]. The present case report is a rare entity of both localised gingival recession with an isolated apical soft tissue fenestration, not very often seen in relation to the maxillary canine, the etiology of which was attributed to the presence of a pulpo-periradicularpathosis. In addition to this, a concurrent labio version of the involved canine along with a previous orthodontic intervention can be proposed as contributing factors for the mucosal fenestration. Once the root is exposed to the oral environment, it is susceptible to the formation of plaque, calculus and debris which prevented the reformation of mucosal covering, as seen in the present case.

Various treatment modalities advocated in the literature for managing mucosal fenestrations are root planing along with chlorhexidine mouth rinsing, full thickness mucogingival flap with primary closure, pedicle flap surgery, guided tissue regeneration with resorbable or non resorbable membrane, free gingival grafting.[30,31]A variety of surgical techniques have also been suggested to achieve root coverage in periodontics.[3] Among them, subepithelial connective tissue grafting is considered to be the gold standard procedure.[3] However, its disadvantages such as a second surgical site, increased chances of patient discomfort, patient morbidity, non-availability of required amount of the graft in addition to its difficulty in procuring, particularly, in cases of shallow palatal vault have lead to the search for an alternative material.[8]

AlloDerm is an effective and safe biomaterial for its use as a substitute for palatal connective tissue in root coverage grafting. AlloDerm has proven equivalence to palatal connective tissue graft for root coverage procedures in randomized, controlled clinical trials.[20-22] It does not require a second surgical site to obtain donor tissue and it provides an unlimited amount of tissue to treat multiple teeth in a single appointment. It also provides uniform thickness of tissue which can be easily trimmed and well adapted ensuring short surgical time.[18-21] The quality of donor tissue is also consistent aiding in providing a natural aesthetic appearance. The patient acceptance of this AlloDerm based treatment is also increased due to the elimination of fear associated with using the palate for harvesting donor tissue. The post-operative experience is also less complicated with AlloDerm unlike the sequelae associated with palatal donor surgery. Hence, AlloDerm was used for the root coverage procedures in the present case.

Chong et al[32] have reported that glass ionomer cement was successful in achieving a good apical seal when it was used as a retrograde filling material. Hence in the present case, since isolation was achievable, light cured glass ionomer cement was used as the root end filling material. However, the occurrence of symptoms such as swelling associated with sinus opening in relation to 23 during the inter appointment period in the present case could probably be attributed to the lack of negligence from the patient's perspective with regards to irregular follow up and poor oral hygiene maintenance. Following the removal of granulation tissue a second time,periapical curettage procedure and adequate homecare measures with periodic follow up resulted in successful reduction of symptoms and closure of the defects with no recurrence even after two years. This emphasizes that adequate cooperation, regular follow up, maintenance of proper oral hygieneand good postoperative care is essential in addition to proper diagnosis, meticulous treatment planning and expertise skill.

In the present case, the gingival defects were effectively closed with AlloDerm matrix. Studies have reported that AlloDerm resulted in predictable root coverage and the percentage of root coverage varied between 66 % to 95 % .[18-21] However, a decrease in thickness of keratinized gingiva was

reported with AlloDerm compared to that of connective tissue grafing.[22,23] In the present case, the amount of root coverage attained in the first 6 months was only about 60 % with an adequate increase in the thickness of the connective tissue. However, there was a complete closure of the soft tissue fenestration later. Coronal flap positioning which was done in relation to 23 following placement of AlloDerm matrix resulted in complete root coverage. Cortes et al[33] revealed that the inclusion of the graft can provide greater thickness of the gingival tissue with less recurrence of the recession over time.

Surgical re-entry resulted in direct observation of the changes in thickness of connective tissue following the use of AlloDerm matrix. Scarano et al[16] and Richardson et al[34] evaluated the integration process of AlloDermin histological as well as ultrastructural aspects and pointed out that there was a complete reepithelialization and integration of the AlloDermin to the host gingival tissues. In the present case, absence of AlloDerm remnants and a significant increase in the thickness of connective tissue followed by complete closure of the fenestration suggested that the AlloDerm was completely integrated into the connective tissue bed.

The treatment regimen reported with the use of AlloDerm matrix in the present case resulted in successful closure of both mucosal fenestration and gingival recession in relation to 23. However, a lack of histologic evidence would be a limitation of this case study. Hence, more cases need to be reported to validate the success and predictability of this approach in management of mucosal fenestrations.

## CONCLUSION

Mucosal fenestrations and dehiscence are rare entities, but whenever present, pose a challenging task to the clinician. The present case report represents a rare clinical scenario of an isolated apical soft tissue fenestration with concomitant localized gingival recession which was successfully managed by the combined use of AlloDerm matrix and coronal flap repositioning ensuring successful root coverage of maxillary canine with two years follow up period. This case report showcases a viable and alternative treatment option that can be effectively considered in management of such cases.

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