

CASE REPORT

Complication following frenectomy: A case report

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Abstract

When performing a frenectomy in patients with an increased risk of exposing bone dehiscence, it is essential that the distance between the incisions is not too wide and that they are mainly made in the movable mucosa to secure optimal wound closure.

KEYWORDS

bone dehiscence, etiology, gingival recession, periodontics, surgical complication/treatment

1 | INTRODUCTION

Frenulum attached close to the gingival margin may cause tissue tension, thus contributing to the development of gingival recessions. This paper presents a surgical complication following mandibular frenectomy in a previously orthodontically treated patient, describes the surgical procedure used to treat the complication, and suggests “attention rules” when performing frenectomy. A gingival recession is defined as an apical displacement of the marginal gingiva from a normal position on the crown of the tooth to a level apical to the enamel-cemental junction (ECJ) with exposure of the root surface.¹ Recessions usually occur labially.² In most cases, the etiology is multifactorial. Accordingly, no single mechanism or causal factor can be identified.³ Nonetheless, predisposing primary factors may include traumatic tooth brushing, localized plaque-induced periodontal inflammation, and generalized forms of destructive periodontal disease.^{4,5} Among

possible secondary factors are anatomical causes (such as frenal pull), smoking, and orthodontic treatment, particularly when teeth are moved to positions outside the labial or lingual alveolar bone plates.⁶ Such movements can lead to loss of alveolar bone or the development of labial or lingual bony defects.⁷ Whether orthodontic tooth movement may cause gingival recessions alone or other cofactors, like traumatic tooth brushing, need to be present, is an open question.

A frenulum is a mucous membrane fold that attaches the lip and the cheek to the alveolar mucosa, the gingiva, and underlying periosteum.^{8,9} The frenulum is considered pathogenic and should be removed when (i) an aberrant frenal attachment is present, which may cause a midline diastema; (ii) a flattened interdental papilla with the frenulum closely attached to the gingival margin causes gingival recession and interferes with the maintenance of optimal daily oral hygiene; (iii) an aberrant frenulum with an inadequately attached gingiva

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and/or a shallow vestibule is present.^{10,11} A frenal pull may cause the gingival margin to be drawn away from the tooth surface, thus increasing the plaque accumulation in the sulcus area.⁸ The most common positions for frenula attached close to the gingival margins are between the maxillary and mandibular central incisors and in the canine/premolar areas.

The aberrant frenulum can be treated by frenectomy or by frenotomy. Frenectomy is the complete removal of the frenulum, including its fibrous attachment to the underlying periosteum and alveolar bone. Frenotomy is a more superficial excision and/or relocation of the frenal attachment without the removal of deeply attached collagen fibers.^{8,10} Particularly during a frenectomy, an unfavorably performed procedure can potentially expose parts of the root surface. If the root is without alveolar bone coverage from the marginal toward the apical area, the exposure is referred to as bone dehiscence. An exposed root with an intact band of bone marginally is an example of fenestration.

The aim of this case report is to demonstrate an example of surgical complication following a mandibular frenectomy in a previously orthodontically treated patient, describe the surgical procedure used to treat this complication, and suggest “attention rules” as guidelines for performing frenectomy.

2 | CASE REPORT

A 31-year-old woman with no notable medical history, no usage of medications or tobacco, and fair oral hygiene was referred to a specialist unit with the chief complaint of a lingual gingival recession at the lower right central incisor (Figure 1A). She had orthodontic treatment while in her teens and later, in 2017, because of a relapse. Shortly after bonding the mandibular appliance in 2017, the patient became aware of an apical displacement of the gingival margin at the lingual surface of central incisor (Figure 1A). At the time of referral, the patient was diagnosed with a lingual recession measuring 4 mm vertically and 1.5 mm horizontally at the level of the CEJ. The phenotype was regarded as thin. The axial direction of the central incisor was characterized as neutral, without labial or lingual root torque. A definite labial frenal pull and a narrow zone of keratinized attached gingiva coronal to the fibrous attachment were diagnosed (Figure 1B). The lingual defect was classified according to Smith's classification (the only system that classifies both lingual and palatal recessions).¹² Radiographs of mandibular central incisors showed short roots without loss of interdental bone, but with widened periodontal membrane apically. The incisors responded positively to cold test.

Clinical and radiographic findings in maxillary and mandibular jaws indicated a need for atraumatic oral hygiene instruction. The patient was therefore instructed in roll-brushing technique both lingually and labially. A grafting procedure to cover the lingual recession on the mandibular central incisor was not advocated due to a rather questionable prognosis for such a root coverage procedure.

The labial mandibular frenulum was associated with a decreased vestibular depth, a narrow zone of keratinized attached gingiva, and fiber pull (Figure 1B). To prophylactically reduce the risk of developing a labial recession on the left central incisor, a decision was made to perform a frenectomy with excision of marginally attached connective tissue fibers. During the surgery, a labial bone dehiscence was diagnosed on the central incisor (Figure 2A). Following removal of collagen fibers attached to the underlying bone, a complete closure of the incision lines was attempted with six single interrupted sutures (Figure 2B). Due to a wide incision gap coronally, complete wound closure of the attached gingiva was not accomplished, resulting in an unintended exposure of the bone dehiscence (Figure 2B). At 7-day postoperative control, the open marginal area was partially covered with tissue debris as part of a secondary wound healing process. When the sutures were removed 14 days postoperatively, the labial bone dehiscence on the left central incisor persisted. The exposed area was attempted closed with two interrupted sutures. The 1-month control showed increased root exposure on the left central incisor (Figure 3A), and at 6-week the marginal tissue band had disappeared resulting in a gingival recession measuring 4 mm horizontally and 3 mm vertically (Figure 3B).

A surgical root coverage procedure to cover the recession defect was discussed with the patient, who consented. The denuded root surface on the left central incisor was carefully debrided with curettes. Through an undermining partial thickness incision, a labial envelope was created without releasing incisions. In the palatal area of 25, 26 two anterior/posterior incisions were made, one to two mm apart, close to the gingival margin (Figure 4A). The anterior/posterior length corresponded to the width of the graft, whereas the vertical incisions corresponded to the height. A free-dissected connective tissue graft was harvested, placed in the previously created envelope so that it completely covered the exposed root surface, and secured by non-absorbable sutures (Figure 4B).^{13,14} The wound edges at the donor site were adapted and stabilized by non-absorbable sutures.

The 7-day postoperative control showed a healthy clinical condition with complete coverage of the labial recession to the CEJ. The red color of the labial gingiva indicated profuse blood supply and active wound healing. The sutures were removed 13 days postoperatively. The 4-month control showed optimal wound healing and complete root

FIGURE 1 (A) Lingual recession on lower right central incisor. (B) Fiber pull from labial frenulum with a narrow zone of keratinized attached gingiva coronal to the fibrous attachment

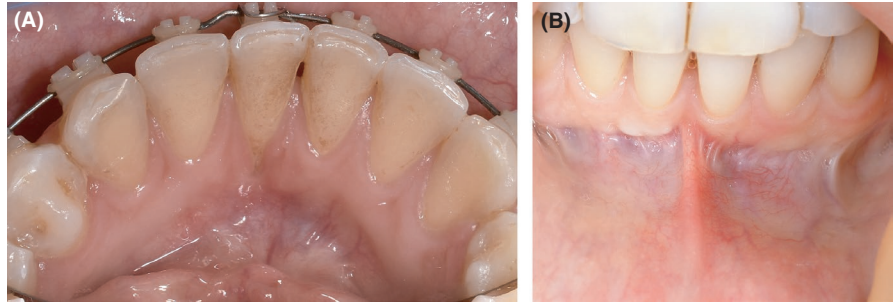


FIGURE 2 (A) During the frenectomy, a labial bone dehiscence was exposed on lower left central incisor. (B) Complete closure of the incision lines in the attached gingiva was not totally accomplished

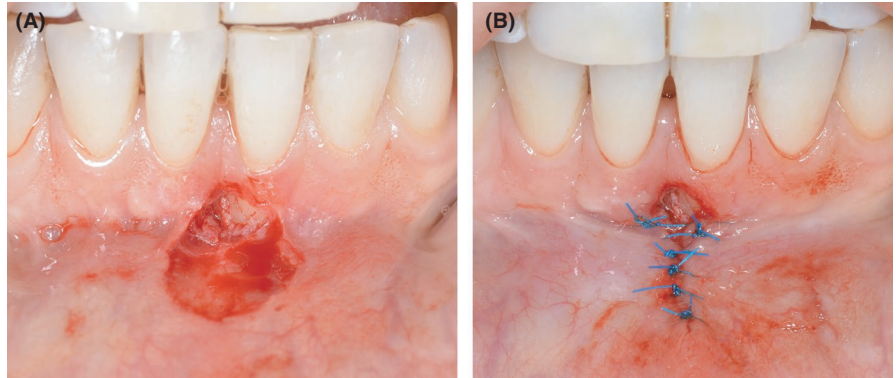


FIGURE 3 (A) One-month postoperative control showed increased root exposure. (B) At 6-week, the marginal tissue band had disappeared resulting in a gingival recession

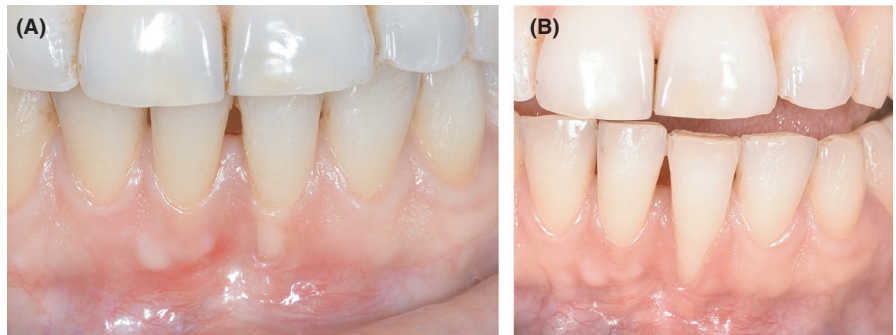
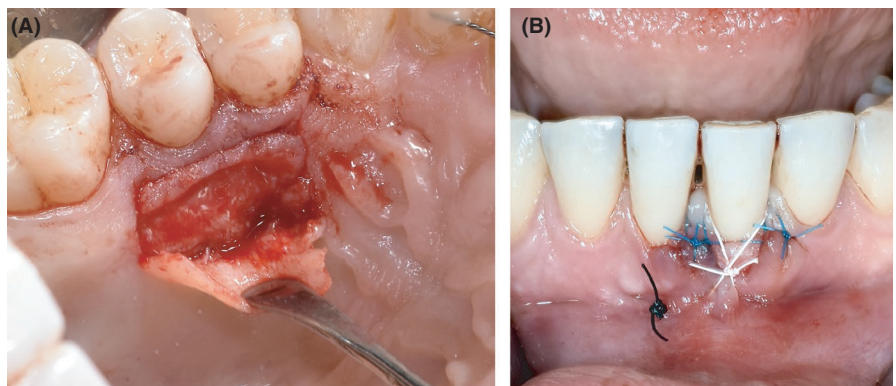


FIGURE 4 (A) Connective tissue graft harvested from palate. (B) Graft sutured into labial envelope around lower left central incisor



coverage of the recession (Figure 5). The 3-year control indicated a stable gingival situation with a wide, robust zone of keratinized gingiva, and full root coverage without probable pockets at the left central incisor (Figure 6A). The lingual recession on the right central incisor was reduced to 3 mm in vertical direction, but still measuring 1.5 mm horizontally at the level of the CEJ (Figure 6B).

3 | DISCUSSION

There is a potential risk of postoperative complications with all kinds of muco-gingival surgery, and during such technique sensitive procedures, microscopical edges exist between success and failure. Traumatic tooth brushing and plaque-induced inflammation are in many cases

regarded as the main causes of the development of gingival recessions.⁴ Especially in the mandibular front area, a frenulum attached near the gingival margin is liable to interfere with optimal hygiene measures, thus increasing the risk of plaque-induced inflammation. A very narrow zone of keratinized attached gingiva coronal to the frenulum attachment makes the gingival margin particularly vulnerable to fibrous pull and unfavorable opening of the sulcus. In this case, a frenectomy was made to remove the fibrous pull from the marginal gingiva, thus reducing the risk of developing a plaque-induced labial recession on a patient with a thin gingival phenotype. During the surgical procedure, a bone dehiscence on the left central incisor was exposed, and the deficient wound closure led to development of a labial recession. The complication was treated with a connective tissue graft and an “envelope technique.”

The likelihood of bony dehiscence during orthodontic treatment, depends on several factors including the direction and magnitude of applied forces, gingival phenotype, and volume and anatomy of the alveolar process and gingival tissue.¹⁵ Most likely these problems can be avoided if the morphology of the alveolar bone is assessed prior to orthodontic treatment. Today, cone-beam computed tomography (CBCT) is a radiographic technique well suited for this purpose.¹⁶ Studies using CBCT have revealed that patients with Angle class I had 35% higher prevalence of root dehiscences and/or lacking alveolar bone than patients with Angle class II, division 1. These findings also showed that defects in the alveolar bone are common.¹⁷ In another study, similar findings were reported.¹⁸ An

important conclusion was that orthodontists should be particularly careful when treating patients with Angle class I occlusion.

Loss of cortical bone plate most often occurs in the mandibular front. In view of the high frequency of labial and lingual bony defects, care should be exercised when altering the axial direction on mandibular incisors.¹⁷ In the mandible, it is critical that the angle between the mandibular plane and the incisors does not exceed 95° after completed orthodontic treatment.¹⁹ If the angle is greater, part of the root may be positioned outside the alveolar process, thus, increasing the risk of developing gingival recessions.²⁰

When planning incision lines for a mandibular frenectomy in a previously orthodontically treated patient, an increased risk of labial dehiscence must be considered. It is critical that the distance between the incisions is not too wide, and that they are mainly located in the movable mucosa. Since an endeavor was made to remove both the main frenulum and lateral frenula close to the left central incisor, the distance between the incisions became rather wide and ended in the attached gingiva. Attached gingiva cannot be laterally moved, and therefore, it was nearly impossible to close the marginal defect. When executing a frenectomy in risk patient with a thin tissue type, it would have been more prudent to remove only the main frenulum and avoiding as much as possible excising the fibers in the attached gingiva. Also, it is particularly critical that the deep fibrous attachment to the alveolar bone is free-dissected and removed with great care without exposing the root surface with its deficient bony coverage. Once the bone dehiscence on the left central incisor was exposed with only a thin band of marginal tissue without adequate blood supply, it was a matter of time before the defect develops into a gingival recession.

Because complications may occur in connection with the surgical procedure, it is the responsibility of the operator to acquire sufficient knowledge and competence to manage potential problems. A persistent labial recession on the left central incisor is most likely to reduce the long-term prognosis of the tooth and be esthetically unappealing. In this case, with the lacking amount of local tissue, transplant surgery was the most appropriate approach to



FIGURE 5 Four months after completion of treatment, showing wide zone of keratinized gingiva and full root coverage

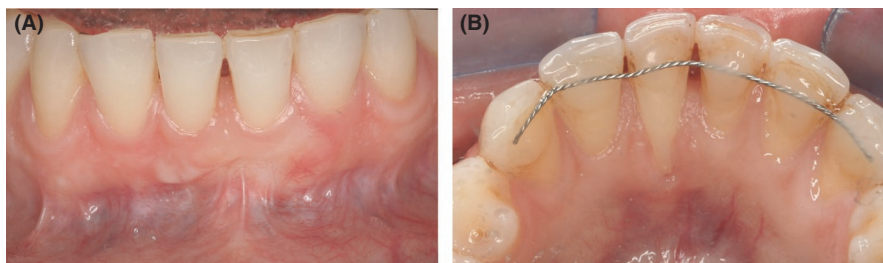


FIGURE 6 (A) Three years after completion of treatment on lower left central incisor showing wide zone of keratinized gingiva and full root coverage. (B) Three years observation of lingual recession on lower right central incision

cover the recession. Provided patients are practicing an atraumatic brushing technique, studies have reported good long-term prognosis with connective tissue transplants and “envelope technique.”²¹

Even at case level, limited data are available documenting surgical complication following a mandibular frenectomy and how to manage such problems. The major strength of this case report is the long-term follow-up period documenting a stable and healthy gingival situation 3 years after surgical correction. The grafting procedure provided a wide and robust zone of keratinized gingiva and full root coverage without probable pockets.

In conclusion, when performing a frenectomy in a previously orthodontically treated patient with a potential risk for exposing a bone dehiscence, the distance between the incision lines should be as close as possible and preferably located in the movable mucosa. In this case, the surgical complication in terms of a labial root exposure was successfully treated with a connective tissue graft using an “envelope-technique.”

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CONFLICT OF INTEREST

The authors report no conflicts of interest related to the article.

AUTHOR CONTRIBUTIONS

All authors have made substantial contributions to conceptualization, treatment planning, drafting the manuscript, revising it critically, and have given final approval of publishing. TS and KNL performed the surgical treatment and the follow-ups of the case.

ETHICAL APPROVAL

The patient described was fully informed on the method and the purpose of the case report. Written consent to participate and for publication was obtained by the patient and is available upon request.

CONSENT

All authors have confirmed during submission that patient consent has been signed and collected in accordance with the journal's patient consent policy.

DATA AVAILABILITY STATEMENT

Data sharing not applicable to this case report as no datasets were generated or analysed during the current study.

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