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RESEARCH ARTICLE OPEN ACCESS

BREAKING THE MIDLINE BARRIER: CONVENTIONAL FRENECTOMY FOR A RESTRICTIVE MAXILLARY LABIAL FRENUM

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ABSTRACT

The maxillary labial frenum is a mucosal fold that plays a role in lip stability but can present anatomical variations impacting aesthetics, speech, and oral function. This case report presents a 20-year-old female with a maxillary labial frenum attachment (Kotlow Class II) contributing to midline diastema and esthetic concern. A detailed clinical examination, diagnosis, and surgical management via conventional frenectomy are described. The case underscores the significance of timely diagnosis and selection of appropriate surgical technique to achieve optimal functional and esthetic outcomes.

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INTRODUCTION

A frenum is an area of mucous membrane that can include muscle fibers, which attach the lips, cheeks or tongue to a mucosa surrounding alveoli as well as the underlying periosteum. The maxillary labial frenum is one of them whose purpose is to provide stability of the lips and limit excessive mobility. Variation in the frenum is not unusual and in most situations non-problematic; nevertheless, raised or aberrant attachments may cause functional and aesthetic issues like midline diastima and gingival recession, restricted lip mobility, speech disorders and difficulties in keeping oral cavity balconied and fit[(1)]. The categorization suggested by Placek et al. categorizes frenum attachment into four groups including mucosal, gingival, papillary, and papilla-penetrating attachment level. The severity of attachment is also graded based on its constriction of mobility in Kotlow classification, which is useful in terms of diagnosis and further treatment planning. Although some abnormal attachments among children might just correct by themselves as a child grows, its continuation usually through adolescence or adulthood should be addressed through an intervention process[(2)]. Aberrant frenum attachment etiology is multifactorial and includes developmental variation, inheritance, or injury or habit like thumb sucking and tongue thrusting. Researchers have also established that an aberrant frenum can create a mechanical impediment to orthodontic space closure and cause relapse unless treated surgically[(3)]. Besides, a diseased frenum that is excessively thick or is made of fibers may constantly pull the gingiva, leading to its recession and inflammation in those patients who are prone to it. Surgical management is considered the treatment of choice when the frenum is implicated in esthetic or functional problems. Various techniques have been described, including conventional scalpel frenectomy, Miller's technique, V–Y plasty, Z plasty, and minimally invasive methods such as electrocautery and laser-assisted frenectomy. While modern approaches such as diode lasers offer advantages of reduced bleeding, minimal postoperative discomfort, and improved healing, the scalpel technique remains widely used in resource-limited settings due to its simplicity, cost-effectiveness, and predictability[(4)]. The present case report details the diagnosis and surgical management of a Kotlow Class II maxillary labial frenum in a young adult, highlighting the importance of thorough clinical assessment, appropriate surgical technique selection, and postoperative care to achieve favorable esthetic and functional outcomes.

CASE REPORT

A 20-year-old female patient, reported to the Department of Oral and Maxillofacial Surgery with the chief complaint of poor esthetics due to spacing between her upper and lower anterior teeth, which she had noticed for the past three years. The patient's medical history was

non-contributory, with no known systemic illnesses. She was born full-term following an uneventful pregnancy and delivery, and her postnatal history was normal. There was no relevant family history of dental or skeletal abnormalities. She had no known allergies and was not on any long-term medications. The patient reported a habit of tongue thrusting, which had been present for several years. No other deleterious oral habits such as thumb sucking, nail biting, or mouth breathing were noted. On general examination, the patient appeared healthy, well-oriented to time, place, and person, and was cooperative throughout the clinical evaluation. Her vital signs were within normal physiological limits: she was afebrile with a pulse rate of 80 beats per minute, a respiratory rate of 16 cycles per minute, and a blood pressure of 120/90 mmHg. No signs of pallor, icterus, cyanosis, clubbing, lymphadenopathy, or pedal edema were observed. The extraoral examination revealed a symmetrical facial profile with competent lips and no signs of swelling, deformity, or temporomandibular joint (TMJ) dysfunction. Intraoral examination revealed a complete set of permanent dentition with good oral hygiene and no evidence of caries, restorations, fractures, or discoloration. The patient exhibited an Angle's Class I molar and canine relationship on both the right and left sides. A distinct midline diastema was observed between the maxillary central incisors (11 and 21), extending to involve the lateral-central incisor regions (12–11 and 21–22). The maxillary labial frenum was found to have a Kotlow Class II attachment, characterized by its insertion into the attached gingiva without crossing into the interdental papilla. The frenum was of normal color, with smooth borders, and exhibited no nodules, lesions, or abnormal tissue growth. The surrounding gingival tissue exhibited mild generalized gingivitis, likely related to plaque accumulation in the interdental spaces. Routine laboratory investigations, including a complete blood count (CBC), bleeding time (BT), and clotting time (CT), were all within normal limits. Radiographic evaluation with an orthopantomogram (OPG) and lateral cephalogram revealed no bony pathology or maxillofacial anomalies. Based on the clinical and investigative findings, a final diagnosis of maxillary labial frenum attachment, Kotlow Class II, with associated midline diastema and mild generalized gingivitis was made. Functionally, the patient exhibited a normal TMJ examination and maintained an Angle's Class I occlusion.

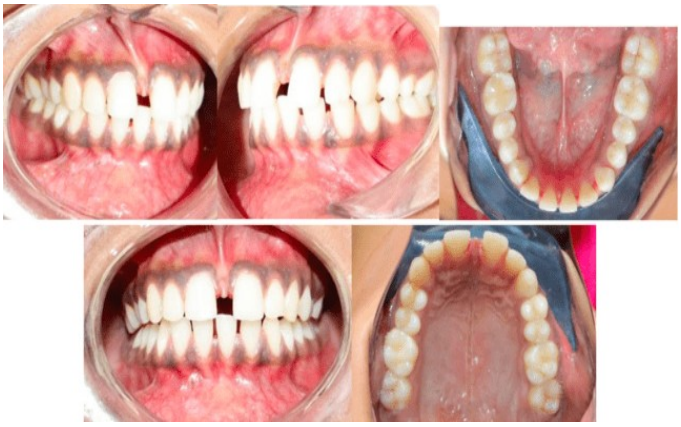


Fig. 1. Pre-treatment intraoral photographs

Treatment Procedure: A conventional scalpel frenectomy was chosen for this case due to its predictable outcomes and suitability for the available clinical setting. The procedure was carried out under strict aseptic conditions.

Step 1 – Preparation and Anesthesia

The patient was seated in a semi-reclined position. The perioral area was disinfected with 5% povidone-iodine solution, and the oral cavity was rinsed with 0.2% chlorhexidine gluconate. Local anesthesia was administered using 2% lignocaine hydrochloride with 1:80,000 adrenaline via local infiltration on either side of the frenum to ensure profound anesthesia and hemostasis.

Step 2 – Engagement of Frenum

The maxillary labial frenum was grasped at its midpoint using a mosquito haemostat to stabilize the tissue and define its full depth. This also helped in elevating and tensing the frenum for precise incision placement.

Step 3 – Incision Phase

With a No. 15 Bard-Parker blade, an incision was made along the upper surface of the haemostat, extending from the lip mucosa toward the alveolar mucosa to the complete depth of the frenum. A corresponding incision was placed along the under-surface of the haemostat.

Step 4 – Dissection of Fibers

Fine surgical scissors were used to separate the deeper fibrous and muscular attachments from the periosteum. This ensured complete removal of restrictive fibers originating from the orbicularis oris muscle.

Step 5 – Periosteal Scoring

Shallow scoring incisions were made over the exposed periosteum to disrupt any remaining fibrous strands, thus minimizing the risk of recurrence.

Step 6 – Hemostasis

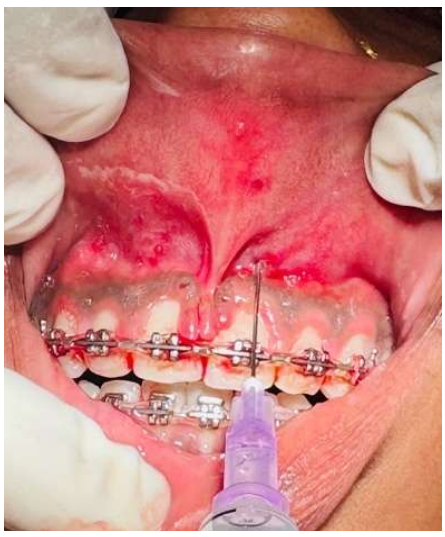
Bleeding was controlled with sterile gauze pressure packs. The adrenaline in the local anesthetic further assisted in maintaining a bloodless field.

Step 7 – Postoperative Care

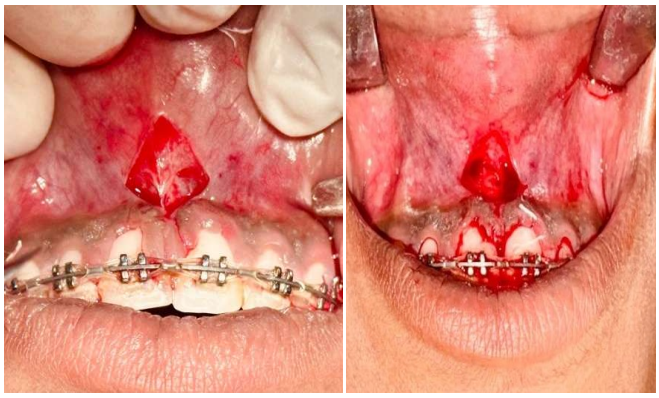
The patient was advised to maintain meticulous oral hygiene, avoid lip manipulation, and follow a soft diet for 48 hours. Analgesics were prescribed (Ibuprofen 400 mg TDS for 3 days), and warm saline rinses were recommended after 24 hours.

Step 8 – Follow-up

At the 7-day review, sutures were removed, and healing was satisfactory with no signs of infection or dehiscence. A 2-week follow-up confirmed stable vestibular depth and no frenum reattachment.



A. Local anesthesia



B. Incision C. Dissected free from the periosteum

Fig. 2. Intraoperative intraoral photographs

RESULTS

The patient underling the operation recuperated easily and there had been no incident of uncontrolled bleeding or tissue injuries during the operation. The postoperative pain was very minimal and it was adequately managed using analgesics. In the recovery period, there was no sign of infection hematoma or wound dehiscence. The surgical site had a satisfactory healing process at the 7-day follow-up with good granulation tissue and devoid of any inflammation. Removal of the sutures was easy and the patient had no uncomfortable condition and trouble in moving the lips. The vestibular depth was sustained at the 2-week review and no recurrence of frenum attachment recorded. The patient was pleased with improvement of the esthetics and especially about diminished tension of the upper lip when smiling. The diastema did not disappear, as was expected; however, the supportive effect of elimination of the restrictive frenum created good circumstances to premeditated orthodontic closure of the space. Stable healing, adequate tissue tone, unscathed and non-fibrous reattachment were confirmed with a 1-month follow-up. It was recommended that the patient be referred to the orthodontics department to undergo management of diastema further.

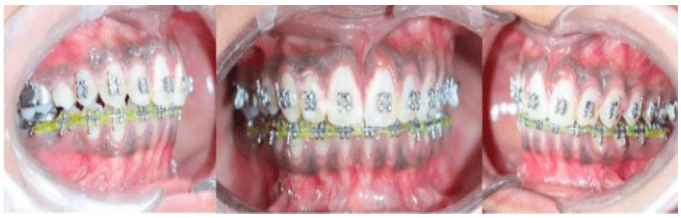


Fig. 3. Post treatment Intra oral photographs

DISCUSSION

Although a normal anatomical structure, the maxillary labial frenum may cause both functional and esthetic complications in childhood when its frenum attachment is excessive in position, thicker, or fibrous. The consequences of what has been very closely linked to high frenum attachment include midline diastema, gingival recession and poor prognosis of orthodontic treatment[1, 5]. However, in the given case, the patient had a Kotlow Class II arrangement in which the frenum would just enter an attached gingiva and not intersect the interdental papilla. This anatomical variation together with an underlying tongue thrusting habit probably produced a permanent tensile force on the anterior segment of the maxilla and this is a factor that enabled the retention of the diastema. The classification by Kotlow can still be used as a useful clinical scoring tool that evaluates the extent of frenum restrictions and surgical decision-making regardless of the perceived lack of biological relevance of the classification in disorders of the gland and jaw[4]. On the same note, the classification of Placek et al. controls the level of insertion view of a classification which is useful in relating frenum morphology to periodontal and orthodontic effects[2]. Surgical correction is indicated when there is abnormal frenum attachment as an esthetic issue and/or where a difficulty in orthodontic spaces closure may occur. Several procedures have been suggested as being utilized in performing frenectomy, with the more traditional one involving the use of a scalpel, in addition to the use of electric cautery, radiosurgery and laser assisted treatment. Indications of laser treatments, including laser using diode or CO2 lasers, became prominent because they allow having good hemostasis, minimize postoperative pain, and enable the development of a rapid healing process[6]. The conventional scalpel is however still common and mostly utilized in cases of resource constrained clinical setting because it is cheap, easy to perform and has predictable outcomes. In the current case, the standard way of doing things enabled accurate frenum fibres dissection, comfortable periosteal scoring and tension-free closure.

There are also considerations of timing of frenectomy. Other authors recommend that intervention should wait until orthodontic closure of space to avoid forming scar tissue to complicate movement of teeth[7]. Still others promote early removal where it is apparent that the frenum is causing the diastema to persist. In the present instance, earlier surgical intervention occurred to remove the constricting fibers thereby providing an opportune situation to follow-up orthodontic treatment. Research results have shown that the frenectomy procedure has proven to be better when combined with orthodontic tooth movement and also lower the relapse risks when used to close a diastema[5, 7]. Moreover, periodontal advantages of consequences of appropriate management of abnormal frenum attachment will be achieved through possible decrease in tension in the gingiva and avoidance of re-recessions. It is therefore imperative to embark on early diagnosis /correction since it is beneficial not only in terms of correcting aesthetically but also in restoring long term periodontal and orthodontic health.

CONCLUSION

Irregular attachment of maxillary labial frenum has a significant consideration as a cause of particular cases of midline diastema, and other oral malignancies of form and functional involvement. A thorough assessment taking into consideration clinical assessment and categorization like that portrayed by Kotlow and Placek is essential in deciding whether surgery is essential. The case in point proves that using classical scalpel frenectomy with a scrupulous technique, one can successfully eliminate restrictive fibers, and preserve the depth of a vestibule, and also offer favorable conditions to orthodontic treatment. Although some alternative sources of success like laser-assisted frenectomy deserve some benefits, scalpel method is stable, available, and affordable in most of the clinical situations. The most positive results are obtained with the involvement of frenectomy in the overall treatment plan that addresses both etiological and functional aspect of the problem.

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