

8-31-2023

Misusing Elastics for Midline Diastema Closure - Disaster and Treatment Via a Case Report in Vietnam

Vo Nhu Truong Ngoc

School of Dentistry, Hanoi Medical University, Hanoi, Vietnam, nhungoc@hmu.edu.vn

Ly Van Huan

Nhu Ngoc Dental Clinic, Hanoi, Vietnam, lyhuan24@gmail.com

Hoang Kim Loan

School of Dentistry, Hanoi Medical University, Hanoi, Vietnam, kimloan@hmu.edu.vn

Dang Trieu Hung

School of Dentistry, Hanoi Medical University, Hanoi, Vietnam, dangtrieuhung@hmu.edu.vn

Ta Thanh Dong

School of Dentistry, Hanoi Medical University, Hanoi, Vietnam, tathanhdongk117rhmu@gmail.com

Follow this and additional works at: <https://scholarhub.ui.ac.id/jdi>



Part of the [Orthodontics and Orthodontology Commons](#), [Pediatric Dentistry and Pedodontics Commons](#), and the [Periodontics and Periodontology Commons](#)

Recommended Citation

Ngoc, V. N., Huan, L. V., Loan, H. K., Hung, D. T., & Dong, T. T. Misusing Elastics for Midline Diastema Closure - Disaster and Treatment Via a Case Report in Vietnam. *J Dent Indones.* 2023;30(2): 149-155

This Case Report is brought to you for free and open access by the Faculty of Dentistry at UI Scholars Hub. It has been accepted for inclusion in Journal of Dentistry Indonesia by an authorized editor of UI Scholars Hub.

Misusing Elastics for Midline Diastema Closure - Disaster and Treatment Via a Case Report in Vietnam

Cover Page Footnote

ACKNOWLEDGEMENT Upon completing this research project, we would like to express our sincerest gratitude to the patient's family for accompanying us during the treatment process and for allowing the images to be used for publication. We would also like to thank our assistants for dedicating their efforts in the long-term period to achieve a favorable treatment plan.

CASE REPORT

Misusing Elastics for Midline Diastema Closure - Disaster and Treatment Via a Case Report in Vietnam

Vo Truong Nhu Ngoc¹, Ly Van Huan², Hoang Kim Loan¹, Dang Trieu Hung¹, Ta Thanh Dong^{1*}

¹*School of Dentistry, Hanoi Medical University, Hanoi, Vietnam*

²*Nhu Ngoc Dental Clinic, Hanoi, Vietnam*

**Correspondence e-mail to: tathanhdongk117rhmu@gmail.com*

ABSTRACT

Midline diastema has been a popular aesthetic problem for children. Several treatment options are available, however, the use of elastic bands without other appliances for closing the diastema still remains a pressing issue in Vietnam, which could be done by the patient's parents either themselves or under the dental practitioners' suggestion. **Objective:** To report a specific case about the extensive extrusion regarding upper central incisors in a pediatric patient due to misusing the elastic band, in which management was complex due to an unfavorable situation for splinting. **Case Report:** Single rubber band usage for orthodontic movement in closing diastema has been an unresolved disaster in Vietnam, leading to the need for early diagnosis and immediate intervention when facing the complications. **Conclusion:** Significant information dissemination is paramount for long-term improvement in the oral health of pediatric patients in Vietnam and around the world.

Key words: bite-raising technique, diastema, palatal expansion technique, rubber band, tooth injuries

How to cite this article: Ngoc VTN, Huan LV, Loan HK, Hung ST, Dong TT. Misusing elastics for midline diastema closure - disaster and treatment via a case report in Vietnam. *J Dent Indones.* 2023;30(2):149-155

INTRODUCTION

Diastema is a common aesthetic problem in both mixed and permanent dentition.^{1,2} It is highly visible when reporting having a frequent occurrence in the median plane of the maxillary arch, especially between the two central incisors and thus, the term "median diastema," "central diastema," or "midline diastema" is regularly used.¹ Notably, the condition is relatively popular in the pediatric age group and at the early stages of dental development.³ Although aesthetic importance in terms of maxillary midline diastema varies according to culture, age range, and racial background,¹ people with central diastema in many countries, including Vietnam, would rather want it closed or removed, because it appears unaesthetic.⁴⁻⁶ Depending on various possible aetiologies, maxillary midline closure could be achieved by different treatment modalities² including orthodontic correction with a fixed or removable appliance, prosthetic correction with composites and crowns, frenectomy, etc., or a combination of these methods.^{2,7}

In orthodontics, elastic bands have long been used to treat diastema, crossbites, and other medical conditions. However, if elastics are used directly without any auxiliary removable or fixed orthodontic appliances, the treatment outcome will be undesirable, even leading to luxation and exfoliation in cases of midline diastema closure. Several such cases have been reported in dental literature since 1870.⁸ Periodontal lesions caused by elastics are sometimes complicated to correctly diagnose due to the lack of proper patient information, no history of recent trauma or orthodontic treatment, or insufficient clinical factors. As rubber bands are considered foreign bodies triggering inflammatory responses, periodontal damage might be independent of the plaque degree. Nonetheless, the principle for this problem is the same for most cases.⁹ A constricting elastic band will tend to move toward the apex, where the root is the narrowest, destroying the dental supporting structures and causing tooth exfoliation, which a study termed "bloodless extraction."¹⁰

Unfortunately, a number of dentists still use this method,⁹ requiring immediate treatment modalities for tooth conservation. A short literature review shows that several studies use splinting,¹¹ orthodontic intrusion,¹¹ and flap surgery.^{9,11} Depending on specific clinical cases, root canal treatment,¹² bone grafting¹¹ or reimplantation¹² are also considered. In cases where the location of the rubber bands is required to be visible or the unique condition of one tooth needs to be investigated, flap surgeries are usually indicated.^{9,11} Also, laser treatment, antibiotics, and analgesics are crucial.⁹ For long-term success, splinting and orthodontic intrusion are used with or without Hawley retainers, especially for immature permanent teeth with open apices, to ensure normal tooth development.¹¹

As mentioned above, the maxillary midline diastema in Vietnam is aesthetically displeasing by dentists and non-professionals.⁶ While many studies reported its high prevalence in children from six years old,¹ and using merely rubber bands for closing diastema remains common due to reduced expenses,¹³ this has also been the case for Vietnam. However, there is a lack of scientific documents regarding this condition in Vietnam, resulting in the unawareness of consequences and, thus, the occurrence of unfavorable complications.

Therefore, the aim of the case report is to present the treatment of a patient with severe periodontal damage regarding upper central incisors induced by elastic bands and spread an alert for this incidence in Vietnam.

CASE REPORT

Case history and findings

A 7-year-old boy visited our private clinic, complaining of pain, tooth mobility, and extrusion regarding upper anterior teeth. The patient had experienced a dental treatment near his house for closing midline diastema and reducing overjet, considering upper central incisors, using an elastic band attaching these teeth, about a month before his appointment in our clinic.

On clinical examination, our patient had a convex profile with a prominent display of upper central incisors (11 and 21) at rest position, in which the lower lip compressed their incisal edges, preventing him from completely closing his lips (Figure 1). Extraoral images also illustrated that teeth 11 and 21 had over-protruding and over-extruding features, which were the most noticeable when smiling. This was further reinforced when taking intraoral photographs into consideration (Figure 2). Intraoral examination demonstrated the mixed dentition with fully erupted permanent teeth, including four first molars and mandibular incisors, while the upper central incisors showed grade 3 mobility and tenderness on percussion. Deep pockets on all sites were noticed on probing, associated with

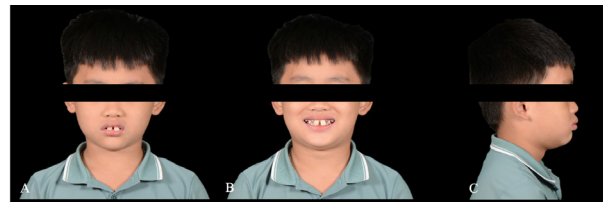


Figure 1. Pre-treatment extraoral clinical view. (A) Frontal view in rest position; (B) Frontal view with smiling; (C) Lateral view in rest position.



Figure 2. Pre-treatment intraoral clinical view; (A) Right lateral; (B) Frontal; (C) Left lateral; (D) Maxillary occlusal and (E) Mandibular occlusal view.

the erythematous and flaccid periodontal tissues and enlarged interdental papillae. The diastema was still prevalent while the lateral incisors and first premolars were in their eruption process. Meanwhile, the lower anterior teeth still touched the cingulum of the two affected teeth. The patient's mother claimed the elastic band had fallen out and showed us when visiting our clinic. We thoroughly checked the subgingival area using the periodontal probe to confirm this.

Pre-treatment radiographs were taken for diagnosis determination and treatment planning. The lateral cephalogram (Figure 3A) indicated the extensive outward protrusion of the maxillary central incisors, while the panoramic radiograph (Figure 3B) demonstrated two permanent upper central incisors with open apices, along with severe bone resorption around the roots in the form of round radiolucency. Furthermore, the Steiner lateral cephalometric analysis (Table 1) revealed pre-treatment measurements of skeletal Class I relationship (A point, nasion, B point [ANB], 2.56°) with a hyperdivergent facial pattern (Frankfort mandibular plane angle [FMA], 30.15°). The overjet of 10.29 mm was considered excessively large, along with proclined (Upper central incisor [UI] – Sella nasion [SN], 126.90°; Upper central incisor [UI] – Nasion point A [NA], 46.38°) and protruded upper incisors (Upper central incisor [UI] – Nasion point A [NA], 13.36 mm). Upper lip protrusion was also noted (Upper lip [UL] – E-plane, 4.39 mm).

All the aforementioned findings provided us with the diagnosis of localized acute periodontitis induced by foreign bodies (the elastic band) for immature permanent



Figure 3. Pre-treatment radiographs; (A) Lateral cephalogram and (B) Panoramic radiograph.

Table 1. Steiner cephalometric measurement analysis*

Measurements	Pre-treatment	Post-treatment
Skeletal		
SNA (°)	81.72	82.44
SNB (°)	77.96	78.26
ANB (°)	2.56	3.88
FMA (°)	30.15	29.71
Dental		
Overjet (mm)	10.29	7.69
Overbite (mm)	1.96	3.80
U1 to SN (°)	126.90	113.15
U1 to NA (°)	46.38	30.71
U1 to NA (mm)	13.36	6.88
L1 to NB (°)	34.61	33.06
L1 to NB (mm)	6.52	5.47
Soft tissue		
UL to E-plane (mm)	4.39	3.45
LL to E-plane (mm)	4.73	3.46

*ANB: A point, nasion, B point, FMA: Frankfort mandibular plane angle, L1: Lower central incisor, LL: Lower lip, NA: Nasion point A, NB: Nasion point B, SNA: Sella nasion point A, SNB: Sella nasion point B, U1: Upper central incisor, UL: Upper lip

upper central incisors, causing extrusive luxation. The prognosis of the affected teeth was relatively poor due to serious bone loss, deep periodontal pocket, grade 3 mobility, severe inflammation, and extrusive luxation.

Treatment objectives

Prompt treatment planning was discussed, which led to the conservative intervention with the major objective of saving the teeth by extensively alleviating the impact on them while thoroughly monitoring the root completion process. As a result, the patient's parents were informed of the necessity of bite raising, splinting, and orthodontic repositioning, and all the subsequent techniques for further orthodontic purposes, such as using myofunctional appliances (twin block, etc.) would be carefully considered after the major objective was guaranteed. Notably, the parents were also informed that the prognosis was poor and the treatment process required a long-term period.



Figure 4. Bite lifting technique for avoiding traumatic occlusion in the anterior teeth, while splinting for preventing tooth extrusion.

Treatment progress

Initially, the bite raising technique was used via the posterior bite plane with the Hawley retainer and the lip bumper in the mandibular arch to release the forces to the upper central incisors. By this, we focused on the impact of the upper lip that could potentially reposition the affected teeth. Splinting of six mandibular anterior teeth was utilized via the composite resin to prevent subsequent tooth extrusion (Figure 4). During the bite-raising process, the occlusion was balanced by identifying the specific contact with the articulating film based on Anderson et al.¹⁴ Meticulous instructions on hygiene regarding affected teeth and the appliances were given, and the patient was re-evaluated every week.

Treatment result

After the initial treatment, a considerable improvement was observed, which demonstrated the overjet range of 11mm in the pre-treatment stage (Fig. 5A) reduced to 9mm after a week (Figure 5B), 7mm after three weeks (Figure 5C) and 5.5mm after a month (Figure 5D).

After a month of using appliances and splinting, the periapical radiograph (Figure 6A) illustrated the narrowing of the radiolucency and normal bone formation around the roots of affected teeth. Compared to the pre-treatment lateral cephalogram (Figure 6B), the post-treatment lateral cephalogram after a month (Figure 6C) also proved a substantial reduction in the overjet. Looking at the panoramic radiograph in the pre-treatment stage (Figure 6D), the panoramic radiograph after treatment (Figure 6E) also demonstrated improved tooth alignment with the near disappearance of the radiolucent lesion. At the time, the upper lateral incisors and first premolars partly emerged, posing the high danger of re-extruding the upper central incisors due to the patient's narrow dental arch. In order to tackle this issue, a palatal expander was used for slow expansion

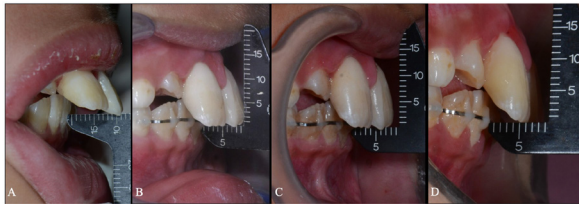


Figure 5. Changes in the overjet range during the treatment process; (A) Pre-treatment stage; (B) A week; (C) Three weeks and (D) A month after the initial treatment.

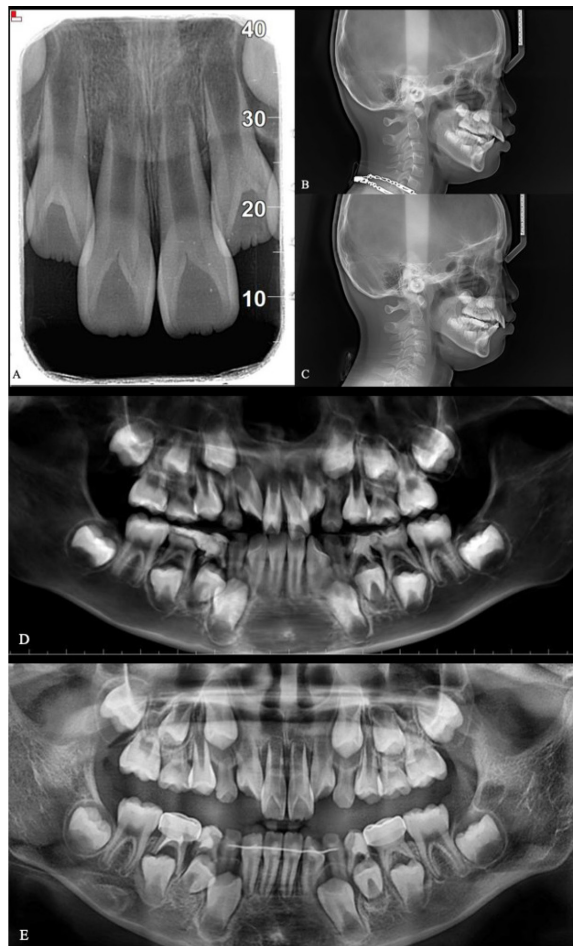


Figure 6. Post-treatment radiographs after a month; (A) Periapical radiographs after a month; (B) Pre-treatment lateral cephalogram compared with (C) Lateral cephalogram after a month; (D) Pre-treatment panoramic radiograph compared with (E) Panoramic radiograph after a month.

corresponding to the repositioning of the affected teeth (Figure 7D). Notably, the appliance needed to avoid central incisors and first premolars (otherwise, it would result in scissor bite).

After six weeks, the maxillary central incisors were aligned more appropriately, with decreased mobility and improved periodontal tissues (Figure 7). In comparison to the extraoral view before treatment (Figure 8A, B, C), the extraoral photograph after six weeks (Figure 8D, E, F) illustrated a normal and natural

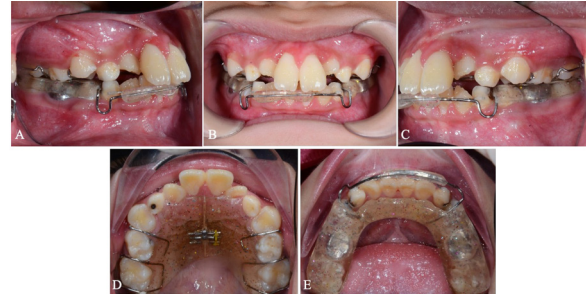


Figure 7. Post-treatment intraoral clinical view after six weeks; (A) Right lateral; (B) Frontal; (C) Left lateral; (D) Maxillary occlusal with a palatal expander; and (E) Mandibular occlusal view.



Figure 8. Post-treatment extraoral clinical view after six weeks; (A) Frontal view in rest position; (B) Frontal view with smiling and (C) Lateral view before treatment, compared with (D) Frontal view in rest position; (E) Frontal view with smiling and (F) Lateral view after 6 weeks.

lip at rest position without teeth appearance, a wider smile at the frontal view, along with less protruded upper central incisors at lateral view indicated by a less protrusive profile. Furthermore, the diastema problem was noticeably resolved. Turning to the lateral cephalometric analysis for the post-treatment measurements (Table 1), an evident skeletal Class I relationship remained (A point, nasion, B point [ANB], 3.88°) with the reduction in the Frankfort mandibular plane angle ([FMA], 29.71°) and great decrease of 2.6 mm in the overjet range. Upper incisors were no longer considered protruded in the analysis (Upper central incisor [U1] – Nasion point A [NA], 6.88 mm – in the normal range) and were less proclined (Upper central incisor [U1] – Sella nasion [SN], 113.15° ; Upper central incisor [U1] – Nasion point A [NA], 30.71°). Normal upper lip position was additionally detected (Upper lip [UL] – E-plane, 3.45 mm).

Three months after the initial treatment, the appliances were removed except for the palatal expander, and we focused on the interceptive orthodontic treatment for guiding tooth eruption. Until now, the patient is on a regular re-examination and showing a stable improvement.

DISCUSSION

In Vietnam, there is still an adequate number of scientific studies focusing on midline diastema. One study has concluded that this condition, specifically when the diastema is from 1.0 to 1.5 mm wide, is perceived as unaesthetic by the Vietnamese.⁶ Therefore, it is reasonable that children and their parents seek dental intervention when it occurs. Our patient was first treated at the dental clinic near his residence. Choosing a healthcare center in the same region as their house, especially in rural areas, is common in Vietnam, as travel costs and remote accommodation can be a financial burden.¹⁵ Meanwhile, as more competent doctors prefer more favorable job opportunities, high-level healthcare services are usually located in metropolitan cities,¹⁵ which can apply to public¹⁵ and private practices. Consequently, resorting to treatments with reduced expenses (using rubber bands for closing diastema) in local healthcare centers, along with insufficient information about its consequences, has led to popular dental problems in Vietnam, as seen in our case. Therefore, communication plans need to be indicated instantaneously so that dentists and patients receiving such a treatment could be alert to iatrogenic tooth loss.

Our case also highlights the advantages of early diagnosis, considering crucial factors including dental history, clinical signs, and symptoms (localized periodontitis inconsistent with plaque degree or unresponsive to treatment, increased tooth mobility and extrusion, etc.). Immediate intervention is paramount, which requires a unique and appropriate approach to specific patients. One of the most essential factors for long-term success is to check whether the rubber band has fallen out of the patient's mouth, which can only be done by thoroughly examining the dental history. If the answer is uncertain, as seen in similar previous cases,^{9,13} checking for the location of the elastics will need to be implemented, both on clinical features and radiographs, to decide the proper treatment plan (i.e., flap surgery) for removing the causes. In our case, the patient's parents had shown us the fallen rubber band, shifting our focus to retaining the damaged teeth without flap surgery.

Conservative treatment for saving the teeth was indicated. However, our clinical case posed some challenges for a successful treatment.

Unlike the previous cases,¹¹⁻¹³ the upper central incisors in our case were severely damaged. In more detail, according to the cephalometric analysis, a hyperdivergent facial pattern before treatment indicated that there was an anterior open bite referring to a lack of vertical overlap in maxillary and mandibular incisors,¹⁶ due to the over-extruding features. Meanwhile, the upper lateral incisors and first premolars just partly erupted. Consequently, splinting for damaged teeth

was considered inappropriate as it would disrupt the eruption process, and thus, a more favorable orthodontic treatment plan could be carried out in the following stage.

Furthermore, considering that detailed analysis of the occlusion is necessary in such cases for the esthetic and functional benefits,¹ when noticing that lower central incisors occluded corresponding to the cingula of the damaged teeth, unblocking the occlusion by using the bite raising technique was done in order to eliminate occlusal interferences¹⁷ to the periodontal tissues and alleviate the mobility problem. Releasing the impact of lower lips on affected teeth was also attained using the lip bumper. Nevertheless, this approach demonstrated the risk of extruding the lower incisors as no obstacles were preventing them from moving upwards. Consequently, the bite-raising technique was applied using the posterior bite plane with Hawley retainers, which resembles the appliances used by Meibodi¹⁸ and Mousa¹⁹ but without tongue cribs, whereas splinting for the lower incisors using the composite resin was utilized to maintain the mandibular teeth's position while retaining the maxillary incisors. We chose the removable posterior bite plane with Hawley appliance for bite raising instead of light-cured orthodontic band cement due to three reasons, which were that (1) the posterior bite plane usually consisted of Hawley retainers,^{18,19} thereby aiding the lower incisors stabilization process; (2) the bite plane facilitated necessary adjustments²⁰ and (3) the orthodontic band cement might not ensure optimized functional occlusion as it only created two contact points,^{20,21} which has been proved to alter neuromuscular behaviors²² and reduce masticatory functions.²¹ The only setback includes extensive compliance and regular hygiene from the patients,²⁰ which requires thorough reminders and guidance from the practitioners.

The upper lip could push upper central incisors posteriorly to their functional positions, restoring the normal range of overjet. After six weeks, the condition of the patient was improved, shown by more aligned maxillary central incisors with a lower level of proclination, lower overjet range, normal lip at the rest position, and disappearance of diastema, as well as decreased mobility and recovered periodontal tissues with normal bone formation. This was further strengthened by reducing the most important cephalometric measurements related to upper incisors, including FMA, U1-NA, and U1-SN. Regarding the purpose of the bite-raising technique to avoid traumatic occlusion or impact on traumatized teeth, the time of resolved alignment and stable tooth condition for subsequent orthodontic treatment might vary depending on each specific case. Therefore, the time for removing the posterior bite plane might also vary, ranging from three weeks²³ to eight¹⁸ or 12 months.¹⁹ In our case, we removed the appliances after three months,

when the affected teeth had been properly aligned, showing a more favorable periodontal condition and reduced mobility.

CONCLUSION

Despite warnings from dental literature, using only rubber bands for closing diastema has remained the common case in Vietnam. Early diagnosis should be determined appropriately, considering the detailed dental history; thereby promoting customized intervention according to the patient's clinical and radiographic features. This could keep the affected teeth from being on the verge of exfoliation to stabilization and potentially having the normal aesthetics and functions. Proposals for information spread and several case reports regarding this situation should be conducted in Vietnam to resolve this disaster, guaranteeing a long-term success in dental treatment and greater oral health for our patients.

ACKNOWLEDGEMENT

Upon completing this research project, we would like to express our sincerest gratitude to the patient's family for accompanying us during the treatment process and for allowing the images to be used for publication. We would also like to thank our assistants for dedicating their efforts in the long-term period to achieve a favorable treatment plan.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

ETHICAL APPROVAL

Informed consent showing approval for data publication was obtained from the patient's parent or legal guardian.

FUNDING

This research received no external funding.

REFERENCES

1. Abu-Hussein M, Watted N. Maxillary midline diastema—Aetiology and orthodontic treatment—Clinical review. *IOSR J Dent Med Sci.* 2016; 15(6):116-30.
2. Abrahams R, Kamath G. Midline diastema and its aetiology—A review. *Dent Update.* 2014; 41(5):457-64.
3. Ghimire N, Nepal P. Occurrence of midline diastema among children of different age, sex and race. *Open Sci Repository Dent.* 2013:e23050409.
4. Al-Rubayee M. Median Diastema in a college students sample in the Baghdad city. *Med J Babylon.* 2013; 10(2):400-6.
5. Gupta R, Shrivastava T, Kallury A, Chaukse A, Ali SA, Sthapak A. Midline diastema closure through combined orthodontic and surgical approach: A case report. *J Appl Dent Med Sci.* 2018; 4(1):107-10.
6. Ngoc VTN, Tran DK, Dung TM, Anh NV, Nga VT, Anh LQ, Hanh NTT, Phuong LN, Quynh HN, Chu DT. Perceptions of dentists and non-professionals on some dental factors affecting smile aesthetics: A study from Vietnam. *Int J Environ Res Public Health.* 2020; 17(5):1638.
7. Schmitt E, Gillenwater JY, Kelly TE. An autosomal dominant syndrome of radial hypoplasia, triphalangeal thumbs, hypospadias, and maxillary diastema. *Am J Med Genet.* 1982; 13(1):63-9.
8. Finkbeiner RL, Nelson LS, Killebrew J. Accidental orthodontic elastic band-induced periodontitis: Orthodontic and laser treatment. *J Am Dent Assoc.* 1997; 128(11):1565-9.
9. Moghaddas H, Pezeshkfar A. Severe gingival recession caused by orthodontic rubber band: A case report. *J Adv Periodontol Implant Dent.* 2010; 2(2):83-7.
10. Redlich M, Galun EA, Zilberman Y. Orthodontic-prosthetic treatment to replace maxillary incisors exfoliated because of improper use of orthodontic elastics: A case report. *Quintessence Int.* 1997; 28(4):241-4.
11. Caldwell CR, Worms FW, Gatto DJ. Orthodontic and surgical intervention to arrest tooth loss secondary to subgingival elastic. *Am J Orthod Dentofacial Orthop.* 1980; 78(3):273-8.
12. Zilberman Y, Shteyer A, Azaz B. Iatrogenic exfoliation of teeth by the incorrect use of orthodontic elastic bands. *J Am Dent Assoc.* 1976; 93(1):89-93.
13. Al-Qutub MN. Orthodontic elastic band-induced periodontitis – A case report. *Saudi Dent J.* 2012; 24(1):49-53.
14. Anderson GC, Schulte JK, Aeppli DM. Reliability of the evaluation of occlusal contacts in the intercuspatal position. *J Prosthet Dent.* 1993; 70(4):320-3.
15. Vuong QH, La VP, Nguyen MH, Nguyen TT, Ho MT. Good budget or good care: The dilemma of social health insurance in Vietnam. *SAGE Open Med.* 2021; 9:20503121211042512.

16. Knigge RP, McNulty KP, Oh H, Hardin AM, Leary EV, Duren DL, Valiathan M, Sherwood RJ. Geometric morphometric analysis of growth patterns among facial types. *Am J Orthod Dentofacial Orthop.* 2021; 160(3):430-41.
17. Roy AS, Singh GK, Tandon P, De N. An interim bite raiser. *Int J Orthod Milwaukee.* 2013; 24(2):63-4.
18. Meibodi SE, Fatahi Meybodi S, Samadi AH. The effect of posterior bite-plane on dentoskeletal changes in skeletal open-bite malocclusion. *J Indian Soc Pedod Prev Dent.* 2009; 27(4):202-4.
19. Mousa MR, Hajeer MY, Farah H. Evaluation of the open-bite Bionator versus the removable posterior bite plane with a tongue crib in the early treatment of skeletal anterior open bite: A randomized controlled trial. *J World Fed Orthod.* 2021; 10(4):163-71.
20. Sankaranarayanan RR, Subramanian AK. Effect of temporary bite raising with light cured orthodontic band cement and acrylic bite plane on the electromyographic response of masticatory muscles. *Ann Dent Oral Health.* 2021; 4:1036.
21. Changsiripun C, Pativetpinyo D. Masticatory function after bite-raising with light-cured orthodontic band cement in healthy adults. *Angle Orthod.* 2019; 90(2):263-8.
22. Pativetpinyo D, Suprongsinchai W, Changsiripun C. Immediate effects of temporary bite-raising with light-cured orthodontic band cement on the electromyographic response of masticatory muscles. *J Appl Oral Sci.* 2018; 26:e20170214.
23. Khan M, Jindal M. Successful treatment of laterally luxated teeth with traumatic occlusion in adolescent patient by single arch fixed orthodontic therapy: A case-report. *Sci Dent J.* 2022; 6(2):87-93.

(Received April 9, 2023; Accepted August 5, 2023)