





CASE REPORT

Orthodontic treatment on patient with maxillary diastema: A case report

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Abstract

Maxillary midline diastema is a space seen in between the upper front teeth. Diastema is part of normal development, and this causes a great challenge for practitioners to intervene or not during the early stage. Diastema on maxillary central incisors on a 24-year-old female patient, with crowding on her mandibular incisors was a success using orthodontic treatment, upper palatal expander, and lower lingual expander. The diastema treatment lasted for only 4 months, and great results were observed. It was confirmed by a panoramic x-ray. Although the diastema gap was successfully narrowed to almost normal, another challenge encountered was midline misalignment. The treatment proposed was to extract all third molars, maxillary, and mandible to correct the midline misalignment.

Keywords incisor, maxilla, diastema, esthetics, dental, orthodontic appliance design, expanders

1 | Introduction

Maxillary anterior spacing or diastema is a common aesthetic complaint of patients seeking orthodontic treatment. Diastema is usually part of normal dental development during mixed dentition.^{1,2} Multiple etiological factors result in a maxillary midline diastema. These are the list of underlying factors of maxillary midline diastema; physiological, familial background, mesiodens, abnormal

labial frenum, missing or undersized lateral incisor, and inter premaxillary suture and pathological tooth migration.² Treatment requires the correct diagnosis of its etiology, this includes medical and dental histories, radiographic, clinical examinations, and tooth-size evaluations. Tooth movements are postponed until the eruption of the permanent canines, but there are other cases with very large diastema that can begin early.¹

There are other types of approaches to diastema treatment. With the use of superior composite resin materials, the acid-etch/composite resin technique results in a conservative and practical approach. A Sectional veneer is another type. However, this treatment is demanding in clinical procedures and high risk of accidental breakage due to reduced ceramic.⁷

Maxillary deficiencies are corrected by rapid palatal expansion (RPE), and it is considered an orthopedic procedure used in children

maxillary constriction. It gives an alternative treatment solution that does not involve surgical intervention. Multiple types of designs of expansion appliances, mini screw-assisted rapid palatal expander have been changed to produce operational advantages and outcomes that can be used in clinical practice.⁴

The case report aims to review the patient's diastema treatment used and to improve its diastema appearance in the shortest timeframe and most conservative way.

PATIENT HISTORY

Date of Exam: 07-17-2021
 Name: _____
 Birth Date: 01-19-1997
 Parent's/ Guardian's Name: _____
 Occupation: _____
 Address: Pulungbato, Talamban Cebu
 Telephone: (Home) _____
 (Buss.) _____
 Cell Phone No.: _____
 Email Add: _____

Chart #: _____
 Sex: Male Female
 Age: 24 yr _____ mo

CHIEF COMPLAINT: "Crowded lower incisors / spacing upper centrals"
 Past Medical/Dental History: - Px is healthy (no past medical history),
 - Had oral prophylaxis last June 2020
 Prior Orthodontic History: N/A

Under any treatment or medication now? Yes No
 Congenital Abnormalities: Yes No
 Temporomandibular Joint: Yes No
 Oral Hygiene: Yes No
 Gingival Tissues: Yes No

Figure 1. Patient's dental chart indicating the chief complaint

and adolescents. However, in adults, it is considered rarely successful and can produce undesirable effects.¹³ RPE might be recommended for patients at the final pubertal growth stage with

2 | Case presentation section

2.1. Chief complaint

A 24-year-old female patient visited the dental clinic to address her maxillary anterior diastema. She feels self-conscious whenever she smiles, because of the wide gap between her maxillary incisors (Figure 1).

2.2. Medical & dental history

The patient is healthy with no known medical issues since birth. Her dental history shows that the patient had her

and no hard tissue pathology. She had a symmetrical face, competent lips, and a normal smile line. The patient had a 2 mm overjet, a 3 mm overbite, and a deep Curve of Spee. No dental caries was observed upon both clinical and radiographic examinations. The patient had a class 1 malocclusion and a constricted lower arch. The dental chart showed impacted lower third molars and unerupted upper molars.

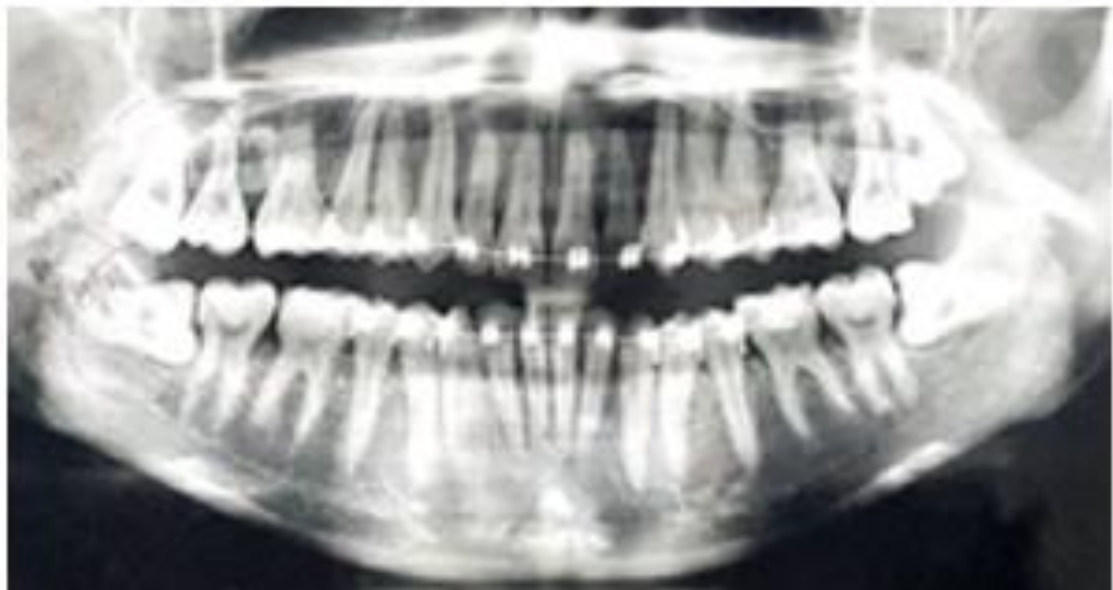


Figure 2. Panoramic Radiograph of a patient showing horizontally impacted mandibular 3rd molars, overlay restorations on both the first and second mandibular molars, and a maxillary diastema on her maxillary anterior between tooth #11 (upper right central incisor) and tooth #12 (upper left central incisor).

oral prophylaxis last June 2020.

2.3. Diagnosis & etiology

A clinical examination revealed a maxillary diastema of 3 mm on her maxillary anterior between the central incisors 11 and 21 with healthy gingiva

She was diagnosed with maxillary diastema—an inherited condition from her mother (Figure 2).

2.4. Prognosis

Closure of maxillary midline diastema was accomplished in 4 months with the

use of orthodontic metal braces. The patient's prognosis is good. The patient gained back her confidence in her smile.

2.5. Treatment

The treatments applied were an upper palatal expander and a lower lingual expander. The patient had worn it for 2 months. The bracket size used on both the upper and lower arches is 0.14mm with Nickel Titanium arch wire. The bracket prescription used is MBT. The treatment lasted only 4 months, and great results were observed. It was confirmed by a panoramic X-ray.

3 | Discussion

In this case report, a female patient complained about a gap between her maxillary central incisor and crowded lower incisors. The patient's chart revealed Class I malocclusion with an overjet of 2mm. The treatment proposed in this case was palatal expander and lower lingual expander. Tooth movement occurs as a result of normal age changes. Most individuals seek treatment for correction of their malocclusion, crowding, alignment, and diastema. In the last two decades of the 20th century, many patients sought orthodontic treatment concerning their appearance. Orthodontic treatment was used to correct the midline diastema however, despite the successful outcome and no sacrifice of tooth structure,

orthodontic treatment is time-consuming, extensive procedure, and orthodontic pain. Another limitation is discomfort to the patient. Understanding which wire causes the least amount of root resorption and is the most effective is crucial.

Removable appliances can be used for orthodontic closure of the diastema that is limited to the central incisors and has good posterior occlusion. However, the patient also has Class I malocclusion which requires the use of fixed appliances. Fixed-type appliances may offer better control for overbite, overjet, and crown/root angulation.¹⁵ In certain instances, closing a diastema requires bodily approximation of the incisors. Full banded/bracketed orthodontic arch appliances can move incisors to close the space.¹ The bracket is initially supplied with a small diameter arch wire. In this case, diastema was closed by palatally tilting the incisors and controlled tooth movement.¹

There are also other treatments other than orthodontic intervention and these are the restorative solutions (veneers, crowning, and composite buildup). However, this treatment is demanding in clinical procedure and high risk of accidental breakage due to reduced ceramic.⁸

With this orthodontic approach, orthodontists have started emphasizing aesthetics more as a

treatment goal. Because orthodontics is unable to predict which patients are at risk of relapse, those who will remain stable, and the extent of relapse that will occur in the long-term, dentists need to treat all patients as if they have a high potential to relapse. The teeth tend to pull back towards their pre-treatment position as a result of forces from periodontal fibers which is why it is necessary to have retention in orthodontic treatment to avoid relapse on the occlusal outcome. In just four months, the patient's diastema was treated and great changes were observed from a panoramic x-ray. Although diastema closure was a success, there was another challenge present, a midline misalignment. Extraction of all the third molars was part of the treatment plan, this is to correct the midline misalignment and the crowding of the lower incisors.

4 | Conclusions

The management of spacing among teeth, also termed "gap" or "diastema," is an esthetic challenge. Before performing any orthodontic treatment, it is necessary to consider the etiology of the midline diastema. Proper diagnosis and timing are important parts of management. The diagnosis, treatment, and retention of patients depend on the orthodontist's ability to assess the various important factors and predict the risk of

developing midline diastema in future generations. Environmental factors and genetic influences collectively have a significant impact on the etiology of midline diastema. Orthodontic treatment is used to treat maxillary midline diastema. The pretreatment plan's intended objectives were accomplished.

Institutional Review Board Statement

The study was conducted in accordance with the Declaration of Helsinki, and approved by the Ethics Committee of Southwestern University PHINMA School of dentistry.

Informed Consent Statement

Informed consent was obtained from the patient and the attending dentist. All methods have been exhausted to maintain the anonymity of the patient.

Acknowledgments

The authors would like to extend their gratitude to the members of the Armamento Dental Studio and the faculty members of Southwestern University PHINMA School of dentistry.

Conflicts of Interest

The authors declare no conflict of interest.

References

1. Huang WJ, Creath CJ. The midline diastema: a review of its etiology

- and treatment. *Pediatr Dent*. 1995;17(3):171-179.
2. Jaija AM, El-Beialy AR, Mostafa YA. Revisiting the Factors Underlying Maxillary Midline Diastema. *Scientifica (Cairo)*. 2016;2016:5607594. doi:10.1155/2016/5607594
 3. Hasan HS, Al Azzawi AM, Kolemen A. Pattern of distribution and etiologies of Midline diastema among Kurdistan-region Population. *J Clin Exp Dent*. 2020;12(10):e938-e943. Published 2020 Oct 1. doi:10.4317/jced.57122
 4. Suzuki H, Moon W, Previdente LH, Suzuki SS, Garcez AS, Consolaro A. Miniscrew-assisted rapid palatal expander (MARPE): the quest for pure orthopedic movement. *Dental Press J Orthod*. 2016;21(4):17-23. doi:10.1590/2177-6709.21.4.017-023.oia
 5. Marya A, Venugopal A. The Use of Technology in the Management of Orthodontic Treatment-Related Pain. *Pain Res Manag*. 2021;2021:5512031. Published 2021 Mar 9. doi:10.1155/2021/5512031
 6. Gange P. The evolution of bonding in orthodontics. *Am J Orthod Dentofacial Orthop*. 2015;147(4 Suppl):S56-S63. doi:10.1016/j.ajodo.2015.01.011
 7. Wang Y, Liu C, Jian F, et al. Initial arch wires used in orthodontic treatment with fixed appliances. *Cochrane Database Syst Rev*. 2018;7(7):CD007859. Published 2018 Jul 31. doi:10.1002/14651858.CD007859.pub4
 8. Novelli C, Scribante A. Minimally Invasive Diastema Restoration with Prefabricated Sectional Veneers. *Dent J (Basel)*. 2020;8(2):60. Published 2020 Jun 24. doi:10.3390/dj8020060
 9. Littlewood SJ, Kandasamy S, Huang G. Retention and relapse in clinical practice. *Aust Dent J*. 2017;62 Suppl 1:51-57. doi:10.1111/adj.12475
 10. Johnston CD, Littlewood SJ. Retention in orthodontics. *Br Dent J*. 2015;218(3):119-122. doi:10.1038/sj.bdj.2015.47
 11. Micu M, Carstairs C. From Improving Egos to Perfecting Smiles: Orthodontics and Psychology, 1945-2000. *Can Bull Med Hist*. 2018;35(2):309-336. doi:10.3138/cbmh.237-112017
 12. Abraham R, Kamath G. Midline diastema and its aetiology--a review. *Dent Update*. 2014;41(5):457-464.

doi:10.12968/denu.2014.41.5.45
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13. Lyu CX, Yang L, Chen LL, Yu FY, Lu HP. *Zhonghua Kou Qiang Yi Xue Za Zhi*. 2019;54(11):778-782. doi:10.3760/cma.j.issn.1002-0098.2019.11.011
14. Hussain U, Ayub A, Farhan M. Etiology and treatment of midline

diastema: A review of literature. *Poj*. 2013;5(1).

15. Wiedel A. P. (2015). FIXED OR REMOVABLE APPLIANCE FOR EARLY ORTHODONTIC TREATMENT OF FUNCTIONAL ANTERIOR CROSSBITE. *Swedish dental journal. Supplement*, (238), 10–72.



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