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ADDRESSING ANTERIOR CROWDING OF THE LOWER JAW WITHOUT EXPANSION SCREWS *(MENGATASI GIGI BERJEJAL ANTERIOR RAHANG BAWAH TANPA SEKRUP EKSPANSI)*

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ABSTRACT

Tooth malposition is a condition in which teeth are not in an ideal position in the jaw. Crowding and diastema are the most common malocclusion conditions encountered because of a mismatch between the length of the dental arch and jaw arch. Mild cases of malposition can be treated with removable orthodontic appliances. This report presents a case of anterior crowding of the lower jaw and the persistence of teeth 75 and 85. Removable orthodontic appliances were used to resolve anterior crowding without using expansion screws to gain space in the lower jaw. The removable orthodontic appliances used were coils and c-rectors as active components, and Adam's hooks to gain retention. Labial bows were used to maintain the shape of the dental arches. In the upper jaw, a central diastema caused by an abnormal frenulum attachment was observed. After 9 months of treatment, the anterior crowding of the lower jaw improved by utilizing the space which was the difference in width between teeth 75 and 85, and teeth 35 and 45, which replaced their positions. The central diastema was not corrected because there were complaints of nausea when the appliance was used; therefore, the

appliance was rarely used. . Patient cooperation in the use of removable orthodontic appliances to obtain good treatment results can be achieved by consistently educating and remotivating patients**.**

Keywords: crowding; diastema; persistence; removable orthodontic appliance

ABSTRAK

Malposisi gigi adalah kondisi ketika gigi tidak berada dalam posisi yang ideal di dalam rahang. Crowding dan diastema adalah kondisi maloklusi yang paling sering ditemui akibat adanya ketidaksesuaian antara ukuran panjang lengkung gigi dan panjang lengkung rahang. Kasus-kasus malposisi yang ringan dapat ditangani dengan alat ortodonti lepasan. Laporan ini menyajikan kasus crowding anterior rahang bawah dan persistensi gigi 75 dan 85. Alat ortodonti lepasan digunakan untuk menyelesaikan crowding anterior tanpa menggunakan skrup ekspansi untuk mendapatkan ruang pada rahang bawah. Alat ortodonti lepasan yang digunakan berupa koil dan c retaktor sebagai komponen aktif dan cangkolan adam untuk mendapatkan retensi. Labial bow digunakan untuk menjaga bentuk lengkung gigi. Pada rahang atas terdapat diastema sentral yang disebabkan oleh perlekatan frenulum yang tidak normal. Setelah 9 bulan perawatan, crowding anterior rahang bawah membaik dengan memanfatkan ruang yang merupakan selisih lebar gigi 75 dan 85 terhadap gigi 35 dan 45 yang menggantikan posisinya. Diastema sentral belum terkoreksi karena ada keluhan mual ketika alat digunakan sehingga alat jarang dipakai. Kerjasama pasien dalam penggunaan alat orthodonti lepasan untuk mendapatkan hasil perawatan yang baik dapat diperoleh dengan melakukan edukasi dan remotivasi secara konsisten pasien.

Kata kunci*: alat orthodonti lepasan; crowding; diastema; persistensi*

INTRODUCTION

Common malpositioning conditions include crowding and diastema. Crowded teeth interfere with aesthetics and become a place for plaque retention. Crowding can occur because of the presence of large teeth, narrow jaws, or a combination of both. Soft tissue pressure, such as in the cheeks and tongue, can also affect tooth inclination, mandibular anatomy, overjet, and overbite.[1] The type of treatment is chosen based on the severity of the case. In cases of mild-to-moderate lack of space (4-6 mm), interproximal expansion or reduction can be an option. Extraction can be performed in cases of severe crowding (>6 mm). Diastema, defined as excess space in both the upper and lower jaws, usually caused by missing teeth, abnormal tooth size or shape, macroglossia, persistence, wider jaw arches, high frenulum attachment, migration, or tooth movement, both physiological and pathological, genetic, and bad habits. Crowding and diastema can interfere with appearance and reduce self-confidence.[1–3]

The crowding and diastema were corrected using removable orthodontic plates consisting of active and passive components. The active components can be springs, coils, and expansion screws that can move the teeth. While passive components are used to maintain tooth position.[4,5]

The purpose of this case report is to show that a simple design removable orthodontic plate can be used to treat mild crowding in the mandibular anterior by utilizing cases of tooth persistence 75 and 85.

CASE REPORT

A 19-year-old female patient presented with crowded teeth in the front region of the upper and lower jaws for 3 years. A diastema was observed in the upper front teeth. The patient had never used any orthodontic appliances. Food often gets stuck when eating, and this complaint makes patients feel insecure. The patient's general health history was unremarkable. The results of the extraoral examination showed a normal, symmetrical facial type with a convex facial profile. The lip and lip relations were normal, and symmetrical, the nose was normal, and there were no abnormalities in the TMJ (Figure 1).

Figure 1. Extraoral photo, front and lateral view.

Intraoral examination showed moderate oral hygiene and calculus on the lingual surface of the lower anterior teeth. The labial frenulum of the jaw was abnormal, while the tongue, palate, and tonsils were normal. The median line of the teeth was asymmetrical, where the median of the lower jaw shifted to the right, normal overbite, normal overjet, diastema on teeth 11-21, 31-32, normal curve of Spee, and persistence of teeth 75 and 85. There was caries on teeth 75,85, 14, 15, 24, 25, 26, 36 and 37 (Figure 2). On panoramic radiographic examination, tooth buds 45 and 35 were observed with a vertical position in the occlusal direction (Figure 3).

(A)

(B)

(C)

(D)

(E)

Figure 2. Intraoral photographs before treatment: (A) frontal occlusion, (B) right molar relationship, (C) left molar relationship, (D) upper jaw occlusal relationship, and (E) lower jaw occlusal relationship.

Model analysis revealed class I molar and canine relationships according to Angle's classification. Arch Length Discrepancy (ALD) analysis showed a lack of space (2.5 mm in the upper jaw and 0.5 mm in the lower jaw. Bolton analysis shows an anterior ratio of 77.3 with the interpretation that the size of the anterior teeth of the lower jaw was larger than it should be. However, the overall size of the teeth in the upper jaw was in accordance with the size of the teeth in the lower jaw when referring to a total ratio of 93.1. The Pont index shows that there was contraction in the dental arch referring to number 39, which is an indication for expansion in

order to gain space. Howe analysis showed a result of 44.2, which can be interpreted as a jaw requiring expansion. The results of measuring the width of the dental arch was 42.5 mm and the width of the jaw arch was 48 mm, making lateral expansion the right choice to gain space in the upper jaw.

Figure 3. Panoramic radiograph of the patient before treatment.

The diagnosis in this case was class I dentoskeletal malocclusion accompanied by anterior crowding of the upper and lower jaws, and diastema in the median of the upper jaw teeth. The etiology in this case of central diastema was due to the presence of a high maxillary labial frenulum.

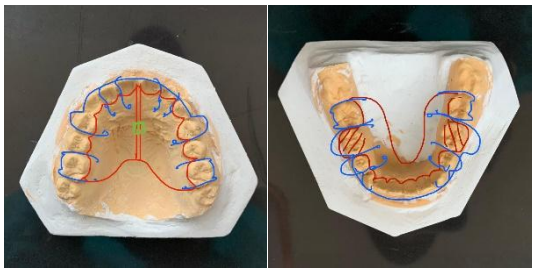

Figure 4. Removable orthodontic design and appliance

The mouth preparation performed on this patient involved ultrasonic scaling of the upper and lower jaws. In the upper jaw, frenectomy surgery is planned for the maxillary labial frenulum, followed by composite restoration of teeth 14, 15, 24, 25, 26, 36, 37, 46, and 47. The treatment plan for the upper jaw is to provide a space of 2.5 mm with an expansion screw tool, and after the space is available, tooth rotation correction will be performed on tooth 22. Next, tooth 13 was pulled palatally with a labial bow tool, and then pushed teeth 11 and 21 mesially with a coil tool to correct the diastema teeth. The treatment plan for the lower jaw began with extraction of teeth 75 and 85, making a plate with an extension in the area of the extraction of teeth 75 and 85 to prevent teeth 46 and 36 from drifting mesially. Teeth 34 and 44 were pushed distally to provide space for teeth 33 and 43. Distalization of teeth 33 and 43 was performed with a C-retractor, and the jaw arch was maintained with a labial bow (Figure 4).

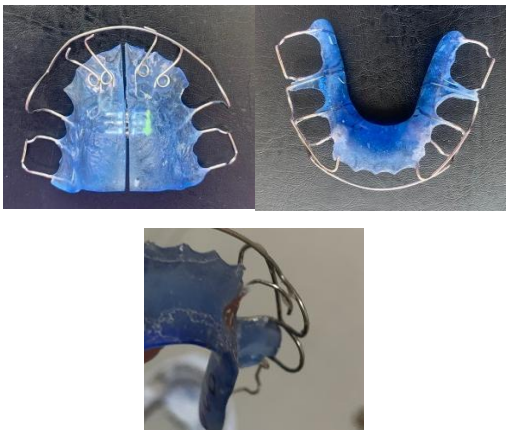

Figure 5. Removable orthodontic.

The expansion screw on the upper jaw was activated 12 times to provide a space of 2.5 mm. After the space was obtained, the coils on teeth 11, 21, 12, and 22 pushed the teeth mesially by enlarging the loop. The labial bow was activated by reducing the loop on teeth 14 and 24 to correct tooth 22 rotation

RESULT

(A)

(B)

(C)

(D)

(E)

Figure 5. Intraoral photos after treatment (A) Occlusion appears to be depressed. (B) Right molar relationship. (C) Left molar relationship. (D) Upper jaw occlusal relationship. (E) Lower jaw occlusal relationship.

At each follow-up visit, the lower jaw plate was reduced with acrylic on the anatomical surface of the area where teeth 75 and 85 were extracted, to provide space for 35 and 45 to erupt, respectively. Coil activation of teeth 34 and 44 to push the teeth distally was performed to provide space for teeth 33 and 43. Coil activation on teeth 34 and 44 was only performed after teeth 35 and 45 had erupted perfectly. C-retractors on teeth 33 and 43 were activated to pull the teeth distally by shrinking the loop.

Figure 6. Panoramic radiograph after treatment

After nine months of treatment, teeth 45 and 35 erupted perfectly, but their positions showed slight linguoversion. Rotated teeth 33 and 43 were also corrected. The diastema of teeth 31-32 was closed. Tooth 13 was pushed palatally

DISCUSSION

Orthodontic treatment using removable appliances has several advantages such as more affordable prices, patients are not disturbed when eating because the appliance can be removed, and patients find it easier to clean their teeth compared to using fixed orthodontic appliances.[4] On the other hand, removable orthodontic appliances also have disadvantages, such as plate expansion, which can cause discomfort, feeling full in the mouth , and also can cause hypersalivation. Hypersalivation may lead to discomfort and has the potential to trigger nausea, particularly in individuals who are sensitive to changes within the oral cavity.[6]

Patient cooperation to continue to routinely use removable orthodontic appliances plays a major role in determining the success or failure of treatment.[7] In this case, the patient admitted to using the upper jaw orthodontic plate less often because there was a feeling of nausea that appeared when the upper jaw plate was used. This may be because the patient is more sensitive to foreign objects in her mouth and eventually caused changes in the upper jaw, as expected. Possible efforts that can be made to reduce nausea in this case were to reduce the expansion of the plate base towards the posterior, while still considering the strength of the plate, especially when the plate receives power when the expansion screw was activated. Reducing the expansion of the plate towards the posterior or making the plate expand in a horseshoe shape in an effort to minimize the closure of the palate is said to reduce the pressure on the tongue. Reduced space for the tongue can cause it to be pushed back and cause nausea.[8]

In addition to reducing the posterior extension of the orthodontic plate, patient motivation must be strengthened so that patients can tolerate nausea better when wearing the appliance. Efforts to increase patient motivation can be initiated by educating patients by explaining why their removable orthodontic appliance must be used consistently, and what happens if the patient is inconsistent in using their orthodontic plate. This education can be continued by repeating the instructions regarding the time of use of the appliance, both when and the duration of use.[9–11]

Bolton's ratios allow the orthodontist to gain insight into the functional and aesthetic

outcome of a given case without the use of a diagnostic setup. Clinically, the Bolton's analysis is used as a tool in anticipating the need for additional treatment of tooth size discrepancies e.g.; upper lateral veeners, lower anterior IPR in order to achieve optimum overbite and overjet relationship.[12] In this case bolton's ratio 77.3 with the interpretation that the size of the anterior teeth of the lower jaw is larger than it should be. However, the overall size of the teeth in the upper jaw was in accordance with the size of the teeth in the lower jaw when referring to a total ratio of 93.1

The lack of space in the upper jaw that caused anterior crowding in this case can be attributed to the use of expansion screws. Activation of the expansion screw in the transverse/lateral direction by ¼ turn at each control produces an average space of 0.2 mm. Routine activation was performed once per week. If the screw rotation is insufficient, the development of treatment will be slow; conversely, if the rotation is excessive, it will increase the mechanical effects of the treatment on the teeth and surrounding tissues.[13] In this case, the activation of the lateral expansion screw in the upper jaw succeeded in providing space so that tooth 13 could erupt better, as shown in Figure 5.

The patient also had persistent teeth 75 and 85 in the lower jaw. The persistence of deciduous teeth can cause replacement teeth to erupt in a crossbite position. Other conditions that can also cause a lack of eruption force are endocrine, neurogenic, or skeletal disorders. Delayed or arrested eruption can also be caused by decreased bone resorption, presence of primary teeth, and presence of supernumerary teeth. Lack of space in or crowding of the jaw arch and rotation of the tooth buds are common causes of impaction.[14] Additional space in the lower jaw in this case was not obtained from jaw expansion, but rather using space from the difference in mesio-distal width of teeth 75 and 85 with their replacements, teeth 35 and 45. After the patient's persistent teeth were extracted, the orthodontic plate was made by expanding the base to the area of the extraction site, namely, the space planned to be occupied by teeth 35 and 45. This expansion was intended to prevent teeth 36 and 46 from shifting mesially so that it could interfere with the eruption of teeth 35 and 45. The anatomical surface of the plate in the occlusal direction of teeth 35 and 45 was reduced slightly at each control to avoid hindering the eruption of teeth 35 and 45. After 35 and 45 erupted perfectly, it was continued by pushing teeth 34 and 44 posteriorly to occupy the space left by teeth 35 and 45. Teeth 34 and 44 were pushed distally using a coil. The space formed on

the mesial part of teeth 34 and 44 was then used to correct the rotation of teeth 33 and 43 by pulling teeth 33 and 43 distally using a C retractor hook by reducing the U loop on the C retractor. The rotation of teeth 33 and 43 was corrected, although not completely finished, as shown in Figure 5.

Diastema in dentistry is the gap between teeth. The gap was defined as the distance between the proximal teeth of more than 0.5 mm. Diastema that occurs between two maxillary central incisors is also called central diastema, while the gap between several teeth is called multiple diastema.[3] Central diastema in this case is caused by an abnormal frenulum attachment.[15] The patient was advised to undergo frenectomy surgery as a solution to the high frenulum attachment, but the patient was not willing to undergo frenulum correction at this time, but was planned to be performed at the end of her active treatment period.[16]

CONCLUSION

The persistence of teeth 75 and 85 can overcome anterior crowding in the lower jaw by utilizing the difference in space between the widths of teeth 75 and 85 and their replacement teeth 35 and 45. Anterior crowding of the lower jaw and persistence of the lower second premolar teeth are effectively performed using plate-making techniques and active tools to correct crowded teeth.

CONFLICT OF INTEREST

The authors reported no potentiial conflict of interest.

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