

**TREATMENT OF CANINE TOOTH EDGE-TO-EDGE
MALRELATION AND INDIVIDUAL DENTAL
MALPOSITION WITH REMOVABLE
ORTHODONTIC DEVICE: CASE REPORT
(PERAWATAN MALRELASI EDGE TO EDGE GIGI
KANINUS DAN MALPOSISI GIGI INDIVIDUAL
DENGAN ALAT ORTHODONSI LEPASAN : LAPORAN
KASUS)**

Bramita Beta Arnanda¹, Nurhayati^{2*}

¹Departement of Orthodontic, Faculty of Dentistry, Universitas Muhammadiyah Surakarta, Surakarta, Indonesia

²Faculty of Dentistry, Universitas Muhammadiyah Surakarta, Surakarta, Indonesia

*Corresponding author
nurhayati080616@gmail.com

JHDS.unjani.ac.id/jite
Doi:
10.54052/jhds.v4n3.p313-324

Article History
Received:06/01/2025
Accepted:08/01/2025

ABSTRACT

Edge-to-edge is a malocclusion characterized by the upper teeth experiencing premature contact with the lower teeth. Treatment to improve anterior edge-to-edge is by retroclination of lower jaw teeth that experience initial contact or premature contact so that they fit into the normal mandibular arch. Case report: A 26-year-old male patient came to RSGM FKG UMS Indonesia complaining of crowding in the front teeth of the lower jaw. This treatment is carried out using a removable orthodontic appliance consisting of an active component in the form of a labial arch to correct edge-to-edge malrelation and a simple spring to correct individual tooth malposition. As a result of 2 months of treatment, the anterior edge-to-edge was corrected, the malposition of

individual teeth was corrected, and the appearance improved. Conclusion: Removable orthodontic treatment using a labial arch in cases of edge-to-edge malrelation of canines over eight meetings gave quite good results. Appropriate case selection and patient compliance are necessary for successful removable orthodontic treatment.

Keywords: edge-to-edge bite; labial arch; malposition; removable orthodontik appliance

ABSTRAK

Edge to edge adalah maloklusi yang ditandai dengan gigi atas mengalami kontak dini dengan gigi bawah. Pengobatan untuk memperbaiki ujung ke tepi anterior adalah dengan retroklinasi gigi rahang bawah yang mengalami kontak awal atau kontak prematur sehingga sesuai dengan lengkungan mandibula normal. Seorang pasien pria berusia 26 tahun datang ke RSGM FKG UMS dengan keluhan berdesakan di gigi depan rahang bawah. Perawatan ini dilakukan dengan menggunakan alat ortodontik yang dapat dilepas yang terdiri dari komponen aktif berupa lengkungan labial dengan tujuan untuk memperbaiki malhubungan dari ujung ke tepi dan pegas sederhana dengan tujuan untuk memperbaiki malposisi gigi individu. Sebagai hasil dari 2 bulan pengobatan, ujung ke tepi anterior diperbaiki, malposisi gigi individu diperbaiki dan penampilan membaik. Kesimpulan: Perawatan ortodontik yang dapat dilepas menggunakan lengkungan labial pada kasus malhubungan gigi taring dari ujung ke tepi selama 8 pertemuan memberikan hasil yang cukup baik. Pemilihan kasus yang tepat dan kepatuhan pasien diperlukan untuk mencapai keberhasilan perawatan ortodontik yang dapat dilepas.

Kata kunci: alat ortodontik lepasan; gigitan edge to edge; lengkungan labial; malposisi

INTRODUCTION

Malocclusion is a misalignment of the upper and lower jaw teeth in the tooth arch outside the acceptable normal range¹. This abnormal relationship can cause problems with self-confidence, chewing, phonation disorders, and swallowing disorders². Several factors cause malocclusion, namely general factors and local factors. General factors are factors that do not have a direct effect on the teeth, while local factors are factors that have a direct impact on the teeth. An example of a common factor that causes malocclusion is hereditary (genetic) bad habits. Hereditary factors that cause malocclusion are the disproportion of tooth and jaw size and the position and shape of the upper and lower jaws. Various bad habits are pushing the tongue, sucking the thumb, biting the nails and lips, breathing through the mouth, bruxism, and biting a pencil or ice cube. Duration and frequency of bad habits can affect malocclusion.⁵ Malocclusion can be classified into three fields: vertical, transverse, and sagittal. Vertical malocclusion is classified as open bite, deep bite, and edge to edge³.

Edge-to-edge bite is one example of malocclusion characterized by upper teeth with premature contact with the lower teeth. Edge-to-edge relationships can be a clinical manifestation of various anomalies,

including grade III malocclusion caused by the sagittal displacement of the mandible or class I pseudo-infraclusion caused by sagittal proclination of incisivus. This multifactorial anomaly is more common in mixed teeth, with a prevalence of 17-18%, and is mainly found in children aged 7-9 years who are associated with incomplete incisivus eruption. Lack of anterior occlusion bite is one of the causes of occlusal instability and temporomandibular disorder.⁴

Malocclusion cases are corrected with orthodontic treatment to balance the 'occluding teeth' occlusal relationship. Orthodontic treatment is divided into removable appliance orthodontics and fixed appliance orthodontics. Cases with simple malocclusion disorders involving dental malposition can be corrected using removable appliances. Cases of malocclusion involving dental and skeletal types can be corrected with fixed appliance orthodontics.^{8,9}

The labial arch is a retentive component of removable orthodontic devices. The labial arch provides retention on the labial surface of the anterior teeth to fit the ideal tooth arch and can push the anterior teeth in the palatal/lingual direction. The force produced by the labial arch in the removable orthodontic is the tipping force. Tipping movement is a tooth

movement where the slanted teeth can be straightened, and the upright teeth can be tilted to get good results and harmonious occlusion according to the shape of the tooth arch. The force produced by removable orthodontic devices is relatively small when compared to flexible orthodontics.^{6,9}

This case report aims to determine the success of edge-to-edge treatment of canine teeth using labial arch in Angle Malocclusion class I cases using removable orthodontic devices.

CASE REPORT

A 26-year-old male patient came in with complaints of his teeth crammed into the front teeth of the lower jaw. The patient complained about this since elementary school. The patient has a history of uncontrolled hypertension, and the patient denies having an allergy to medications, food, or the weather. Based on dental health history, the dentition does not have a history of caries or trauma during the dental period. The period of teeth is mixed, never heading. The patient admits that almost all of his teeth are detached by themselves. The period of permanent teeth, no cavities, or dental treatment has ever been done. Family history: the patient's parents have neat teeth and a large jaw.

The objective examination results

were obtained, and the patient was physically and mentally healthy and able to cooperate well for orthodontic treatment, as well as the nutritional status of obesity II. The results of the extraoral examination showed that the head index was 84 cm (brakisefali), the facial index was 84.9 cm (euribrosphere), the convex facial profile, the TMJ joints were normal, the muscle tone of the mastix and lips was normal, and the freeway space was 3mm. The results of the intraoral examination showed good OHI, macroglossy tongue, and moderate frenulum. Simon's analysis showed the orthognathic upper and lower jaws; measurements obtained an overjet relationship of 2.8 mm and overbite of 2.08 mm. Analysis of front and side view photos (Figure 1) shows the convex patient's face profile.

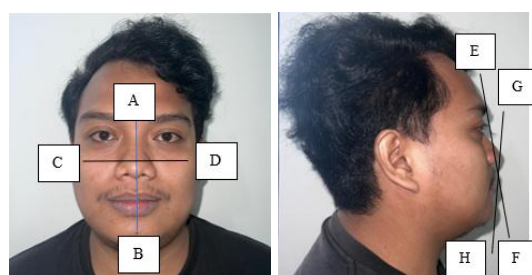


Figure 1. a) front-view photo analysis, b) side-view face photo analysis.

The results of the analysis of the calculation of the Pont method obtained a P index of +1.5 mm and an M index of +1.52 mm experienced slight distraction. The Corkhaus method of jaw growth in the anterior direction experienced a retraction

of 1.52 mm. The Howes method obtained a P index of 44.52% and a fossa canina index of 48.2%. The curve of the teeth is enough to accommodate the teeth. The index of the canine fossa is greater than the premolar index so that the posterior tooth inclination converges towards the occlusal. The following is an intraoral photo of the patient before treatment (picture 2).



Figure 2. Intraoral image of the patient before treatment.

RESULT

The ALD (Arch Length Discrepancy) calculation showed that the upper jaw experienced a discrepancy of – 0.9 mm and the lower jaw experienced a discrepancy of – 0.7 mm. Steiner cephalometry analysis (Table 1) showed skeletal type class I angle malocclusion with proclinal bidentals accompanied by proclusive upper and lower lip protusions.

Table 1. Stainer Sefalometry Analysis Table

	Reference Measurement	Reference Measurement	Interpretation
SNA	82° ± 2	82°	N
SNB	80° ± 2	80°	N
ANB	2° ± 2	2	Skeletal Klas I
Occlusal plane S-N	14°-30	17°	N
MP to S-N	32 ± 2°	31°	N
Dental INA	22°	27°	Proclination
INA linear	2-4 mm	8 mm	Protusif
INB	25°	30°	Proclination
INB linear	2-4 mm	8 mm	Protusif
Interincisal angle	130°±2	121°	
Upper and lower lips to S Line	on S line	Upper and lower lips in front of S line	Upper and lower lips > N

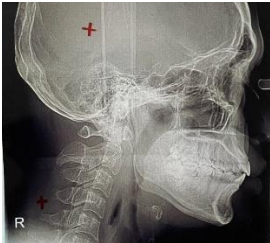


Figure 3. Cephalometric radiography images.

The diagnosis of this case is dentoskeletal type class I angle malocclusion accompanied by edge-to-edge mallation of teeth 13 to teeth 43, teeth 23 to teeth 33 accompanied by malposition of individual teeth, namely tooth 14 mesiopalato torsiversion, 12 distolabio torsiology, 11 distolabio torsiology, 21

distolabio torsiology, 23 distopalato torsiversion, 35 mesiolinguo torsiversion, 31 mesiolinguo torsiversion, 41 mesiolinguo torsiversion, 45 mesiolinguo torsiversi.

Treatment Stage

In this case, the main goal of treatment is to correct individual dental malposition and edge-to-edge malrelation of the anterior teeth using an orthodontic device that detaches the upper and lower jaw. The upper jaw consists of an acrylic plate, a simple spring in 23rd gear, a medium labial arch, and an adam clarm in 16th and 26th gear. The lower jaw consists of acrylic plates, simple springs in teeth 31 and 41, medium labial arch, and adam clarms in teeth 36 and 46. A complete examination of the patient was carried out on the first visit. The second visit was to print the study model using irreversible hydrocolloid materials and analyze the study model. On the third visit, a working model was printed to make an active plate according to the design that had been made—insertion of the upper and lower jaw removable orthodontic devices on August 28, 2024. A retention and stabilization check was carried out on the tool, the adam cladding was adapted, and the spring was not activated. The insertion results are occlusive and anterior (Figure 4).



Figure 4. The removable orthodontic device appears occlude and anterior on the upper and lower jaw.

The first step is to correct the malposition of individual teeth in the first control to the second control with the following details: the first control is carried out enamel reduction using grinding strips on teeth 23 by 0.2 mm, 22 by 0.1 mm, 21 by 0.2 mm, 11 by 0.1 mm, 12 teeth by 0.2 mm, gear 31 by 0.1 mm, Gear 41 is 0.1 and activation is carried out on the simple spring on gears 31 and 41.

The second control was carried out on September 11, 2024. Enamel reduction was carried out on teeth 21 by 0.1 mm, 33 by 0.2 mm, and 43 by 0.2 mm, and simple spring activation was carried out on teeth 23, 31, and 41.

The second step begins with edge-to-edge malrelation correction accompanied by individual dental malposition in the third to seventh control, with the following treatment details. The third control was carried out on September

25, 2024. Enamel reduction was carried out on teeth 23 by 0.1 mm, simple spring activation on teeth 31, 41, and 23, activation of the lower jaw U-loop labial arch, and a reduction in acrylic plates for teeth 33 and 43.

The fourth control was carried out on October 2, 2024. The results of the 31st dental examination were corrected. Then, actions were taken to activate the simple springs of teeth 41 and 23, activate the labial arch of the lower jaw, and reduce the acrylic plates of teeth 33 and 43.

On October 10, 2024, the fifth control obtained the results of dental examinations 43 and 33, which slightly retracted towards the lingual. At this stage, simple spring activation of teeth 41 and 23, activation of the lower jaw's labial arch, and reduction of acrylic on teeth 33 and 43 were carried out.

On October 17, 2024, the sixth control obtained the results of dental examinations 31 and 41, which had been corrected, and teeth 33 and 43 were slightly retracted from the upper jaw. At this stage, simple spring activation is carried out in tooth 23, activation of the labial arch of the lower jaw accompanied by a reduction in the acrylic plates of teeth 33 and 43.

The seventh control on October 25, 2024, obtained the results of the dental examination of 23 distal sides slightly

sprayed towards the buccal. Teeth 31 and 41 have been corrected, and edge-to-edge malrelations of teeth 33 to 23 and 43 to 13 have been somewhat corrected. The next stage is activating the simple spring of tooth 23, activating the lower jaw's labial arch, and reducing the acrylic plates of teeth 33 and 43. The clinical picture of the patients at the eighth control visit (Figure 7) shows the result of treatment on edge-to-edge canine teeth with a final overjet of 2.02 mm and a final overbite of 2 mm.



Figure 5. Intraoral photo of the patient after treatment.

DISCUSSION

Cases of malocclusion can occur when there is an abnormal relationship between the upper and lower jaw teeth, dental abnormalities in terms of number, abnormal tooth development, genetic factors, and bad habits of the patient. Orthodontic treatment results in the movement of the teeth and aims to correct

the abnormal position of the teeth into normal ones according to the ideal tooth arch. The orthodontic force applied to the tooth structure results in a tooth movement by alveolar bone apposition (remodeling) in the position and resorption. The orthodontic force exerted on the teeth is converted into biological activity following the principles of tooth movement theory, namely bone-bending, biological electricity, and pressure-tension theory¹⁵. Treatment with removable orthodontics is the treatment of cases with mild malposition or malocclusion. The biomechanics of tooth movement using removable orthodontic devices is based on the biological principle of intermittent or continuous force applied to the teeth, altering the mechanical system's loading and then eliciting a cellular response that leads to the adaptation of the bone in a new functional environment¹⁶.

This case report shows that using the labial arch as an active component in class I angle malocclusion accompanied by edge-to-edge malocclusion has been proven to perform anterior tooth retraction, especially in the case of edge-to-edge canine teeth. It shows that the labial arch with the activated U-loop can retract the teeth in the palatal or lingual direction, and the teeth will move tipping according to their normal curve. The labial bow is one of the removable orthodontic device's components that

retracts and retains the tooth arch consisting of 2 U-loops, arch wire (horizontal bow), and a retentive arm. The labial bow is activated by shrinking the U-loop by 1 mm. To obtain a normal pressure force so that the archwire of the labial bow will move 1 mm of the palatal or lingual collar.^{17,18}

This case report has undergone several changes that led to the patient's ideal occlusion. Malposition of individual teeth on tooth elements 11 is dystobiotorsion (slightly corrected), tooth 21 is dystobiotorsion (corrected somewhat), tooth 23 is distopalatobiotorsion (uncorrected), tooth 35 mesiolingobiotorsion (uncorrected), tooth 31 mesiolingobiotorsion (corrected), tooth 41 mesiolingobiotorsion (corrected), tooth 45 mesiolingobiotorsion (uncorrected). Edge-to-edge malocclusion (slightly corrected) is characterized by an inclination of teeth 33, 43 experiencing retraction in the lingual direction of the tooth cups 13, 23 within 2 months (figure 5). Although, in this case, the correction of malocclusion is not optimal, this can be caused by several factors, one of which is the quality of the bone and the denser thickness of the cortical bone, which is the cause of resistance from tooth movement^{19,20}. Still, it can be proven that the mechanics of the active component of the labial arch can push the teeth in the

direction of lingual.⁸ Under the principle of moving teeth orthodontically, a force that can last for a long time is needed, but it does not mean that it has to be a continuous force. This force must remain for several hours daily to induce a cellular reaction in the periodontal ligament. One study showed a threshold for strength duration in humans of 4-8 hours, and that more effective tooth movements are produced if the strength is maintained for a longer duration^{15,16}. In simple terms, it can be said that the optimal pressure applied to the teeth will lead to remodeling the alveolar bone to allow the teeth to move.¹³

CONCLUSION

Edge-to-edge malrelation of canine teeth and malposition of individual teeth can be corrected within 2 months using removable orthodontic devices in the form of labial arch and simple spring. Proper case selection and patient compliance are necessary for successful removable orthodontic treatment.

CONFLICT OF INTEREST

The author states that there is no potential conflict of interest.

ACKNOWLEDGEMENT

The author would like to express his deepest gratitude to the patient for cooperating during treatment.

REFERENCES

1. Schwarz A. Textbook of Orthodontiks (2nd ed). New Delhi: Jaypee Brothers Medical Publishers; 2007. p. 396-9.
2. Santos Barrera, M. *et al.* (2024) 'Oral Habits in Childhood and Occlusal Pathologies: A Cohort Study', *Clinics and Practice*, 14(3), pp. 718–728. doi: 10.3390/clinpract14030057.
3. Wininger, Fred A. , Zeng R., Johnson, G.S., Katz, M.L., Johson G.C., Bush, W.W. , Jarboe, J.M., Coates, J. R. (2020) 'Case report: Case report', *Canadian Family Physician*, 47(10), pp. 788–789.
4. Wininger, Fred A. , Zeng R., Johnson, G.S., Katz, M.L., Johson G.C., Bush, W.W. , Jarboe, J.M., Coates, J. R. (2020) 'Case report: Early Management of an Edge-to-edge Incisor Occlusion', *Canadian Family Physician*, 47(10), pp. 788–789.
5. Anindita, P. (2023) 'Penggunaan Labial bow Sebagai Komponen Aktif pada Pencabutan Premolar Pertama (Kajian pada Typodont)', *e-GiGi*, 11(2), pp. 313–317. doi: 10.35790/eg.v11i2.47646.

6. Setyowati, P. and Ardhana, W. (2013) 'Perawatan Maloklusi Kelas III dengan Hubungan Skeletal Kelas III disertai Makroglosia', *Majalah Kedokteran Gigi Indonesia*, 20(2), pp. 184–191. Available at: <https://jurnal.ugm.ac.id/mkgi/article/view/File/7963/6339>.
7. B, P. N. W., Almira, M. and Juliawati, H. (2022) *Proceedings of the International Conference on Sustainable Innovation on Health Sciences and Nursing (ICOSI-HSN 2022), Proceedings of the International Conference on Sustainable Innovation on Health Sciences and Nursing (ICOSI-HSN 2022)*. Atlantis Press International BV. doi: 10.2991/978-94-6463-070-1.
8. Wu, J. lei *et al.* (2018) 'A biomechanical case study on the optimal orthodontik force on the maxillary canine tooth based on finite element analysis', *Journal of Zhejiang University: Science B*, 19(7), pp. 535–546. doi: 10.1631/jzus.B1700195.
9. Cobourne M, DiBiase A. *Handbook of Orthodontiks* (2nd ed). Elsevier Ltd; 2016. p. 1–16, 256, 268.
10. Mae, A. *et al.* (2022) 'Multidisciplinary management of a Class I edge-to-edge malocclusion: A case report', (September). doi: 10.5281/zenodo.7067848.
11. Isaacson KG, Muir JD, Reed RT. *Removable orthodontik appliances*. New Delhi: Elsevier; 2006. p. 24–7.
12. William J.K (2000) *Prinsip dan Praktik Alatalat Ortodonsia Cekat*. Jakarta : Penerbit Buku Kedokteran EGC. 2000 : 1- 8
13. Proffit RW, Fields WH, Sarver MD. 'Contemporary orthodontics. 6th ed. London :Elsevier; 2019. 3-4, 107, 132 p
14. Patel VD, Jyothikiran H, Raghunath N, Shivalinga BM. Enroute through bone: biology of tooth movement. *World J Dent* 2012; 3(1): 55-9
15. Shroff B. *Biology of orthodontic tooth movement*. Philadelphia: Springer; 2016. p.2.
16. Li Y, Acox LA, Little SH, Ko CC. Orthodontic tooth movement: the biology and clinical implications. *Kaohsiung J Med Sci* 2018; 34: 207-14.
17. Zietsman ST, Visage W, Coetzee WJ. Palatal finger springs in removable orthodontic appliances-an in vitro study. *SADJ* 2000; 55(11): 621-7.
18. Pawinru, A. and Serliawati (2021) 'Biomechanics of tooth movement' *Makassar Dental Journal* 2021 : 10(1) : 82-87, p-ISSN:2089-8134
19. Rahma Mansyur, S. and Andi Adam, M. (2022) 'Wilckodontics-an interdisciplinary periodontics-orthodontic approach to accelerate

- orthodontic treatment time: a literature review', *Makassar Dental Journal*, 11(1), pp. 89–94. doi: 10.35856/mdj.v11i1.517.
20. Pudyani, Pinandri Sri (2005) 'Pengaruh Kekurangan Kalsium Terhadap Daya Reversibilitas Kalsifikasi Tulang Sebagai Faktor Penunjang Keberhasilan Perawatan Ortodontik' *IJD* : 12 (1) : 30-35

