



Case Report

Removable Orthodontic Treatment for Managing Relapse Due to Eruption of Third Molars: A Case Report

Puspitarini Nindya Wardana^{1*}, Surya Saputra², Chantika Azzahra Anindita Putri³, Sekar Hasna Khairunnisa⁴

¹Department of Orthodontics, Faculty of Dentistry, Universitas Muhammadiyah Yogyakarta, Special Region of Yogyakarta, Indonesia

²Faculty of Dentistry, Universitas Muhammadiyah Yogyakarta, Special Region of Yogyakarta, Indonesia

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Abstract

Relapse is a return to the initial form of malocclusion after correction. Relapse occurred after the patient underwent a fixed orthodontic treatment, and it could be associated with the role of third molar eruption. The use of removable orthodontic appliances can maintain the retention period to prevent relapse. This report aims to report the use of removable orthodontic appliances in correcting a minor relapse case. A 23-year-old patient came to RSGM UMY complaining of misaligned upper and lower front teeth for several months after completing fixed orthodontic treatment. She felt her lower front teeth were crowded and moved more backward than the other teeth. The treatment used maxillary and mandibular expansion plates to gain space. The active plate on the maxilla was a medium labial arch and a simple spring on the mandible. A checkup of the patient was seen once a week which involved cleaning the oral cavity and the plate, measuring the space by the activated expansion screw, and checking for correction of individual teeth. The bilateral expansion plate can be used to correct mild anterior crowding due to relapse, followed by an active plate with a simple spring. The success of treatment was influenced by the patient's cooperation and compliance with using removable orthodontic appliances.

Keywords: expansion plate; relapse; removable orthodontic appliance

INTRODUCTION

The evolution of dentistry, particularly in the field of orthodontics, is increasingly in demand. Practically everyone has an individual malocclusion issue that needs to be treated.¹ Genetic factors also play a role in individuals' susceptibility to malocclusion.² Malocclusion is an abnormal condition characterized by a mismatch in the relationship of the upper and lower jaws or an abnormal position of the teeth.³ It is a deviation of occlusion from the normal position.⁴ Malocclusion can occur in various combinations, and therefore, it may be difficult to classify the malocclusion into

intra-arch, inter-arch, or skeletal malocclusions.⁵

Malocclusion is the most common dental problem complained by patients, which encourages them to seek orthodontic treatment.⁶ The purpose of orthodontic treatment is to correct the teeth alignment and abnormal jaw relations to achieve occlusion, normal function, and improved facial aesthetics. The other purpose is to obtain harmonious facial form, better masticatory relations and function, as well as the stability of the final result.

Based on the patient's ability to remove the appliances, orthodontic appliances can be categorized into removable and fixed orthodontic

* Corresponding author, e-mail: puspitarini@umy.ac.id

appliances. Several factors underlie the selection of orthodontic appliances. These factors are growth potential, type of tooth movement, oral hygiene, and cost. Patients with skeletal malocclusion during their developmental period should be treated with an appliance that could modify the jaw growth. Removable orthodontic appliances could be used in patients who require simple tipping movement. More complex movements require fixed orthodontic appliance as it has higher treatment success and better outcomes.⁷

Orthodontic treatment is divided into 2 periods: active period and passive period. During the active period, mechanical pressures from the appliance are used to correct the malpositioned teeth. Meanwhile, the passive period occurs after the active period is over.⁸ According to Proffit, teeth positions may still be unstable when the appliance is removed, allowing continuous pressure from the surrounding soft tissue, which may result in relapse occurrence.⁹ Relapse in orthodontic treatment, according to Renfroe, is a return of complete or partial malocclusion.⁸

The aforementioned factors may suggest some of the causes of relapse, and the most important aspect is the etiology of malocclusion. According to Bhalajhi (2001), one of the several factors that may cause relapse is the role of the third molar as it erupts latest in the dentition growth period.¹⁰ This report aims to report the use of removable orthodontic appliances in correcting a minor relapse case.

CASE REPORT

A 23-year-old female patient complained about the improper position of her upper and lower front teeth several months after finishing her fixed orthodontic treatment. The patient felt that her lower front teeth were crowded and shifted backward than the other teeth. There were also some misalignments on the upper front teeth. The patient stated that she had worn a fixed orthodontic appliance and had finished the treatment about 1.5 years ago. The patient wore the retainer for only 6 months, used full time in the first three months, and only during sleep in the last three months. The operator concluded that the patient did not wear the retainer continuously after her fixed orthodontic treatment had finished. The patient also had a bruxism issue.

Extraoral examination showed that the patient's head shape was classified as brachycephaly, while the patient's face shape was euriprosopous with a convex facial profile. The temporomandibular joint (TMJ) examination was normal, and the patient's upper and lower lips have normal muscle tone. Intraoral examination showed that the right and left first molar relations were classified as Angle Class I malocclusion and the right and left canine relations were classified as Class I canine relationship. The patient's overjet was 4.4 mm and the overbite was 3.8 mm. The patient's oral hygiene was good and there was no caries. The patient's 38th tooth was partially erupted. The arch length discrepancy analysis showed a lack of 1.6 mm space in the right mandible.

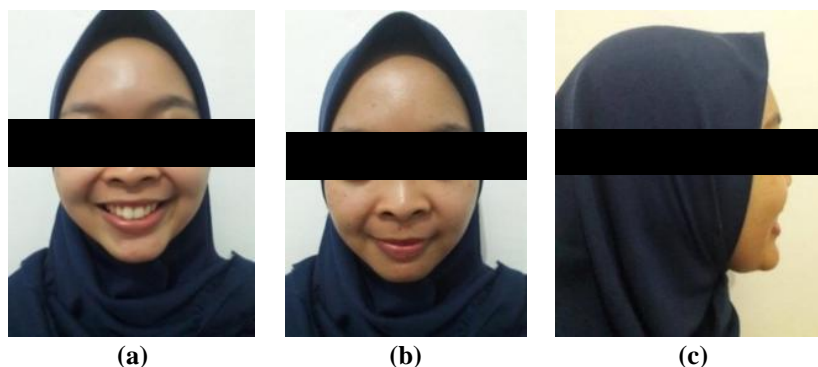


Figure 1. Extraoral pictures before the treatment. (a, b) Frontal view. (c) Lateral view

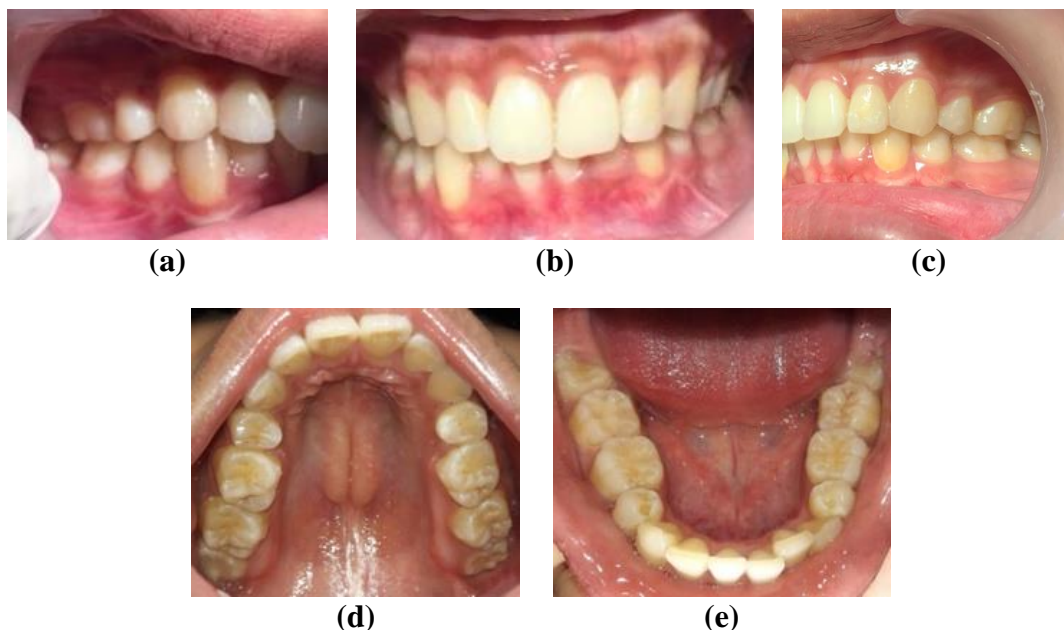


Figure 2. Intraoral pictures before the treatment. (a) Anterior view. (b) Right view of teeth relations. (c) Left view of teeth relations. (d) Occlusal view of the upper teeth. (e) Occlusal view of the lower teeth, partially erupted 38

The panoramic radiograph (Figure 3) showed supporting tissues and alveolar bone within normal limits. Moreover, teeth 38 and 48 are fully formed.



Figure 3. The radiograph shows that teeth 18 and 28 normally erupt, while teeth 38 and 48 are fully root-formed

Case Management

The analysis showed that a lack of space in the right mandible region required a removable orthodontic appliance with a plate combined with an expansion screw to gain space. This case used symmetrical bilateral expansion plates. The appliance

was inactive when inserting the expansion plate for the first time to let the patient adapt. Then, education was given to the patient regarding the insertion and removal of the appliance and the instructions to wear the appliance full time, including bedtime, except when eating and brushing teeth. The patient was also asked to return for a checkup once a week.

On the next visit, the checkup procedure began with subjective and objective examinations of the patient's oral hygiene and chief complaints. We also checked the retentivity of the appliance and measured the maxillary and mandibular interpremolar to evaluate the results of the bilateral expansion every week. During each visit, the expansion appliance was activated twice (1/4 for each rotation) for each maxillary and mandibular plate until the patient felt pressure from the appliance.



Figure 4. Bilateral expansion plate

In the 4th visit, there was a 1.1 mm improvement in maxillary inter premolar and a 0.8 mm improvement in maxillary inter premolar from activation in the first visit. The third molar odontectomy was undertaken after the fourth visit as the patient also complained of frequent pain (pericoronitis).

On the fifth visit, the patient had recovered and had undergone the healing phase after the odontectomy. During the visit, the appliance was fitted and readjusted. There was a relapse and a reduction in maxillary inter-premolar and mandibular inter-premolar; hence, 3 times rotations were done for each maxillary and mandibular plate. Furthermore, each plate was activated twice (1/4 per rotation) until the patient felt the pressure. The procedure was carried out until the 9th visit, followed

by teeth impression and appliance replacement to an active plate with auxiliary springs.

On the 10th visit, an active plate with a simple spring on tooth 42 was constructed. The procedure was done by activating the U loop of the labial arch by narrowing the U loop until the patient felt the pressure on tooth 11, which had a distolabiotorsion malposition. Simple spring activation on tooth 42 with a linguoversion was done by widening the arm. Both active component activations were performed until teeth 11 and 42 reached the ideal arch. In addition, the maxillary labial arch was activated by activating the U loop and reducing the acrylic plate in the palatal area to retract maxillary incisors and decrease the overjet.

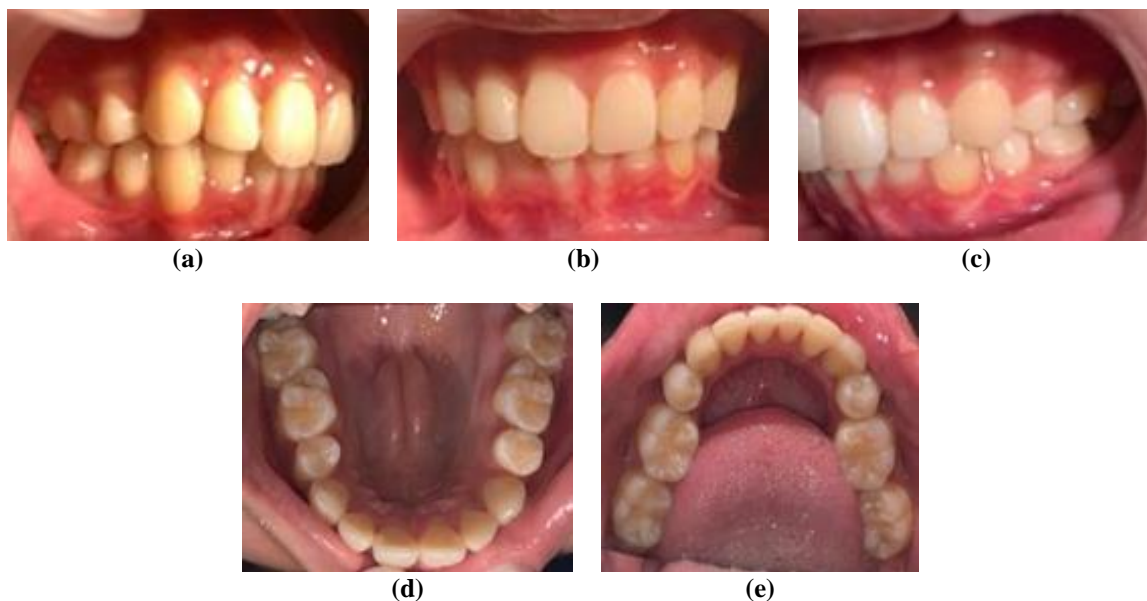


Figure 5. Intraoral pictures after the treatment

(a). Right view. (b) Frontal view. (c) Left view. (d) Occlusal view of maxilla. (e) Occlusal view of mandible.

After completing the active period, the patient used a passive appliance that involved the insertion of Hawley-type removable orthodontic retainers on the upper and lower jaws to stabilize the teeth' positions already in the ideal arch.

DISCUSSION

Public awareness about aesthetics, especially dental aesthetics in the modern era, is increasing. Lifestyle and trends may influence people to find aesthetic value by seeking dental treatment, particularly orthodontic procedures. Many patients who receive fixed orthodontic treatment assume that their treatment is completed when their braces are removed. However, with the removal of the braces, the orthodontic treatment is not completed yet.¹¹

Many patients are not aware of the importance of passive or retention period treatment. Retention prevents relapse or prevents the teeth from returning to their initial position from malocclusion¹¹. Retention keeps the teeth in position long enough to stabilize the corrected teeth.⁸ Stabilization with retention is an important part of orthodontic treatment.¹²

The rate of relapse cases in patients after fixed orthodontic treatment is quite high. In some cases, relapse may not occur because the teeth are successfully preserved¹³. The high rate of relapse in patients after active orthodontic treatment is found in several studies, which report that relapse of less than 1 mm is found in 89% of cases, and relapse of less than 3 mm is found in 11% of cases.¹⁴ In another study, success in maintaining a satisfactory tooth arrangement is only found in less than 30% of the various therapies in active orthodontic treatment.¹⁵ Other data support the high percentage of relapse after active orthodontic treatment, which shows that 40-90% of patients have an inappropriate tooth arrangement 10 years after the completion of active orthodontic treatment¹⁶.

Cases of relapse after fixed orthodontic treatment may vary across

patients. Relapse may occur partially or completely or even lead to new malocclusions. Some of the causative factors include periodontal and gingival tissue factors, growth factors, bone adaptation, muscle pressure, failure to eliminate causative factors, the role of third molars, occlusion role factors, bad habit factors, soft tissue pressure, type of malocclusion, and changes in the shape of the jaw arch.⁸ Of the several causative factors mentioned, the role of third molars is discussed in this case report as it can cause relapse after fixed orthodontic treatment, leading to malposition of the teeth. Discussing the factors that can cause relapse can not be separated from the main factors: periodontal and gingival tissues. These tissues maintain the balance between teeth and soft tissues required during the post-fixed orthodontic tissue remodeling period.¹⁷

When the tooth is moved orthodontically, the periodontal and gingival tissue surrounding the tooth will be stretched.¹² This stretched tissue will shorten, which can potentially induce the tooth to relapse. The periodontal ligament tissue adapts to its new position rapidly. The main tissue adapts in 3-4 months, and the gingiva collagen adapts after 4-6 months. The elastic tissue in the dentogingival and interdental tissues takes more than 8 months to adapt, whereas the alveolar bone takes 1 month to adapt.¹⁸

It is important to identify the main factor that causes relapse after fixed orthodontic treatment. Another factor is the role of third molar teeth, which are the last to erupt in the dentition period. The third molar may influence the occurrence of relapse. In most cases, the third molars erupt around 17 to 25 years.^{12,19} By that age, most patients have completed their orthodontic treatment. When erupted, the third molars could exert an anterior force concentrated around the canines and incisors, resulting in rotation and misplacement of the teeth or malposition.⁸ The pressure from the growth of the third

molar is the cause of the improper arrangement of the anterior teeth, which is prone to relapse.¹²

Based on the patient's condition in this case report, two of the patient's mandibular third molars had partially erupted before the fixed orthodontic treatment and began to erupt at the end of the treatment, which lasted 1.5 years. After fixed orthodontic treatment, the patient admitted not wearing the retainer continuously in the retention phase. The patient's mandibular third molars could be seen on X-ray in partial eruption, and she complained that her lower front teeth started to crowd and shifted back to their initial condition before the fixed orthodontic treatment. Six months afterward, the patient complained of severe pain in the area of an impacted left mandibular third molar, which had pericoronitis condition. The patient had an odontectomy procedure on the left mandibular third molar 4 months later, followed by the right mandibular third molar, which also experienced impaction and pericoronitis.

The possible cause of relapse is a lack of space for the third molar eruption, which impacts other teeth, especially on the anterior side, and results in crowding or a new malocclusion. Crowding of the lower incisors is often observed alongside the eruption of the third molars, which leads clinicians to look into a possible cause-and-effect relationship between the two events. The hypothesis is that the force from the erupting third molar is transmitted through the dental arch and allows migration of the mesial side of the tooth, thereby converging in the incisor area. It results in a loss of available space; hence, crowding teeth occurs.²⁰ Cotrin (2019) suggested that prophylactic removal indication of the third molar to avoid incisor mandible crowding is not justified.²¹

It is necessary to extract the mandibular third molar if it is impacted. This extraction can occur before, during, or after orthodontic therapy. Extraction can

stop the recurrence of congestion. A clinical trial should be conducted properly and with a good design to evaluate the precise effect of third molar odontectomy to prevent orthodontic relapses.²²

Another theory was delivered by Lyros (2023), who reported that third molars did not cause re-crowding in the mandibular anterior teeth if the interproximal contacts were removed. The hypothesis is that mesial forces from erupting molars could not be transmitted through the teeth without interproximal contact, thereby preventing anterior crowding. Nevertheless, the results of several review articles suggest that the presence or absence of third molars does not change the results even without removing the interproximal contacts.²³

Relapses after fixed orthodontic treatment could be treated with removable orthodontic appliances in the form of expansion plates for space gaining and active plates for correction of malpositioned teeth. The treatment could also involve retention and stabilization procedures for teeth with the use of retainers to reduce the chances of relapse or new malocclusion.

Removable orthodontic appliances have several advantages: they are affordable, have a simple shape, and are easier to clean. However, the success of treatment to reduce the occurrence of relapse depends on the patient's compliance, where the appliance will only work if it is used continuously. Observation of the patient's compliance with using a retainer is needed to monitor the treatment stability.²

CONCLUSION

The bilateral expansion plate could be used to correct mild anterior crowding due to relapse, followed by an active plate with a simple spring. The success of treatment was influenced by the patient's cooperation and compliance with using removable orthodontic appliances.

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