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Short Communication

Development of the *Merah-Putih Orthodontic Compass:* A novel instrument in dentistry for assessing the parallelism of posterior brackets to rectify the alignment of anterior teeth in orthodontic treatment

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ABSTRACT

Orthodontic treatment is recognized in society as a dental procedure that requires a lengthy duration and necessitates multiple visits from the patient. This treatment often enhances the self-confidence of individuals who are dissatisfied with the alignment of their teeth. Accelerating the duration of orthodontic treatment cannot be accomplished by neglecting medical considerations, such as the health of dental and periodontal tissues. Focusing on anterior correction may be appropriate if the patient has well-aligned posterior teeth and is primarily concerned about the anterior teeth. This article discusses a method for orthodontic treatment that focuses on the anterior teeth, while using the posterior teeth for anchorage. A tool has also been developed to assist dental professionals in implementing this method. By focusing exclusively on improving the arrangement of the anterior teeth, it is hoped that orthodontic treatment can be expedited, enabling patients to achieve their desired results more quickly and enhance their confidence.

1. Introduction

Orthodontic treatment is generally recognized by the public as a procedure performed by professionals to position the teeth in a more optimal and ideal arrangement according to the principles used in dentistry. This procedure often causes movement in both anterior and posterior teeth while considering the occlusal relationship between the upper and lower jaws. This makes orthodontic treatment often require a considerable amount of time, as many teeth need to be moved while maintaining good occlusion. The symmetrical structure of the face is another aspect that is highly regarded in orthodontic treatment.[1]

Accelerating orthodontic treatment by applying excessive force to pull or push teeth is inadvisable, as it can diminish pulpal blood flow, reduce tooth sensitivity, and negatively impact the health of the surrounding periodontal tissues.[2,3] Moving teeth without considering occlusion to speed up treatment is also not recommended in dentistry. One possible method to expedite orthodontic treatment is to reduce the number of teeth being moved and, whenever possible, to avoid significant changes to occlusion.

Limited Treatment Orthodontics (LTO) or Short-Term Orthodontics (STO) is a treatment option recognized by the British Orthodontic Society (BOS), where orthodontic movement only involves six anterior teeth.[4] Although this type of orthodontic treatment is not intended for more complex cases, patients who wish to improve the alignment

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of their anterior teeth still have the right to decide what type of treatment they want to pursue. Patients may opt not to include posterior teeth in orthodontic treatment due to minor alignment issues and a desire to expedite changes in the anterior teeth. Diastema in the front teeth is also one of the criteria evaluated for joining the police and military in Indonesia, where proper dental alignment is essential.[5] Orthodontic treatment can focus on the anterior teeth, enabling the patient to finish quickly and proceed with police or military recruitment. The purpose of this article is to present a new simplified technique for correcting the position of the anterior teeth. The objective of this technique is to reduce the duration required for orthodontic treatment.

1.1. Development of a new orthodontic tool

Orthodontic treatment focusing on the six anterior teeth can also be understood as applying orthodontic brackets only to these teeth. The absence of brackets on the posterior teeth is expected to prevent any influence on their position. However, placing brackets solely on the anterior teeth significantly limits orthodontic treatment. The lack of posterior teeth to serve as anchors can hinder the process if brackets are only applied to the anterior teeth. Anchoring teeth are typically found in the posterior region, allowing the anterior teeth to be pulled towards or pushed away from the posterior teeth. Inadequate anchorage makes efforts, such as moving anterior teeth to close an anterior diastema as previously mentioned, less effective. Therefore, having posterior anchorage should still be considered when correcting anterior teeth.

Dental alignment often captures the attention of institutions in Indonesia, including the police and military. Although it may sometimes be seen as less important, orthodontics can assist individuals in achieving not only better physical health through improved chewing function and nutrient absorption but also contributes significantly to mental health and social performance.[6,7] The police and military indeed consider both medical and aesthetic factors in the recruitment process. A well-aligned set of teeth is anticipated to enhance an individual's confidence, enabling them to engage actively in social environments filled with interaction and communication. Individuals who hesitate to smile broadly or speak freely due to embarrassment about their dental alignment may unintentionally restrict their potential. Based on this, orthodontics is a branch of dentistry that cannot be overlooked, and the creation of *Merah-Putih Orthodontic Compass* is also an effort expected to bring significant benefits to individual and social life.

2. Description of the tool

The Merah Putih Orthodontic Compass serves as a reference tool for the placement of brackets on the posterior teeth to ensure they are in parallel alignment. In orthodontic treatment, teeth are indeed often used as anchorage.[8,9] The parallelism of the posterior brackets aims to prevent movement of posterior teeth, thus not altering the interdigitation. Placing brackets in a parallel manner on the posterior teeth can be utilized as an anchor to pull or push the anterior teeth, with a lower potential to affect the arrangement of the posterior teeth compared to conventional bracket placement principles. The wire in the bracket extends to the posterior teeth, enabling greater flexibility in creating tooth movements like the intrusion or extrusion of anterior teeth. Achieving all of this would be difficult if the focus of correcting the anterior teeth were limited to placing brackets only on anterior teeth. To date, there is no dental concept in the world that detailedly addresses this, let alone develops a tool to facilitate the parallel arrangement of posterior brackets. The innovation in the development of this tool is anticipated to assist dental professionals in positioning orthodontic brackets to direct tooth movement specifically towards the anterior teeth.

The *Merah-Putih Orthodontic Compass* has two main components, which are:

1. The body of the device (see Figures 1 and 3). This part can be adjusted to accommodate the shape and size of the patient's jaw and serves as a point of movement for the bracket clip.
2. The clip (see Figures 2 and 3). This part comprises six clamps, each equipped with its own opener (lever), designed to secure the brackets in position, thereby facilitating their attachment to the teeth. The spacing between the clamps can be modified to accommodate the size of each tooth that necessitates a bracket.

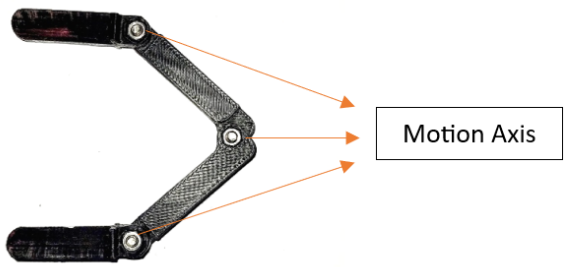

Figure 1: Compass body

This tool should fit comfortably in the mouth, specifically in the vestibule between the cheek and teeth, and must be free of sharp edges to prevent injury. The clamps should securely hold the bracket while allowing for easy release after attachment to the tooth. They must also ensure the bracket remains parallel for wire insertion. The clamp lever should be easily accessible and not overly stiff. The clamp distance should be adjustable to fit different tooth sizes while ensuring secure placement after adjustment. The

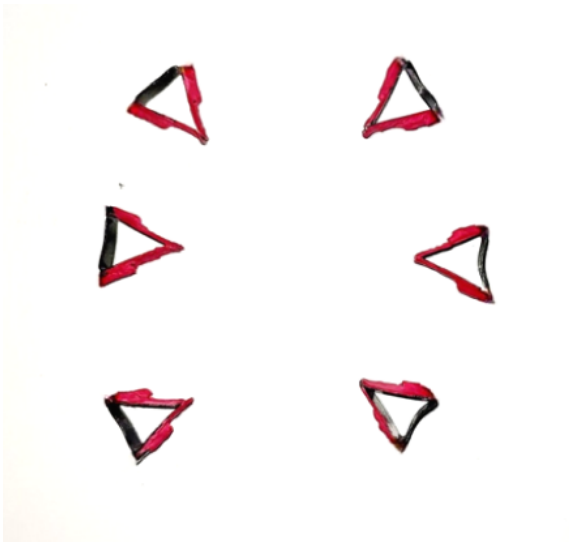

Figure 2: Compass clips

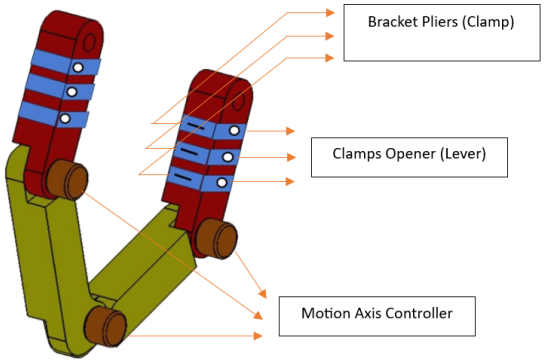

Figure 3: Compass design

motion axis controller should allow the operator to easily adjust and lock the tool's width once the correct size is set.

3. Implementation of the Tool

The distance between the brackets is tailored to the size of the patient's teeth. The brackets are aligned parallel on the clamps (see Figure 4) to enable a straight wire placement across three posterior teeth after bonding.

The *Merah-Putih Orthodontic Compass* is placed at the patient's mouth, aligning approximately parallel to the imaginary line from the tragus to the ala nasi (seeFigure 5). If the posterior teeth relationship is not excessively compromised, the bracket arrangement on these teeth focuses on achieving parallelism among them, rather than considering each tooth's specific condition. This parallelism serves as an anchor for correcting the anterior teeth's alignment. For teeth positioned more inward (palatoversed or linguoversed), thicker adhesive material can be applied

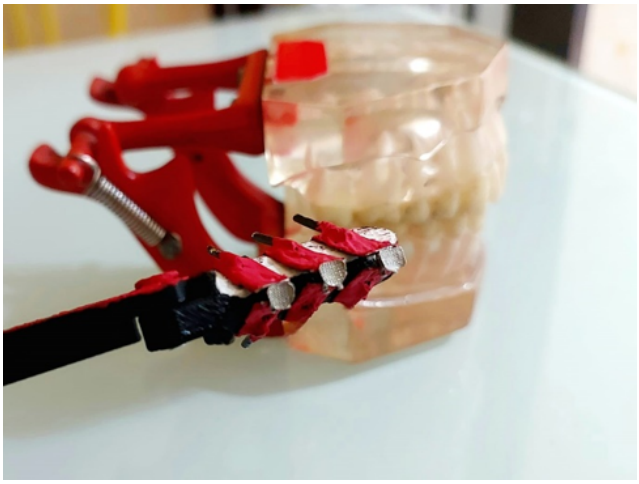

Figure 4: Brackets are clamped in a parallel arrangement.

to the brackets to maintain parallelism. The *Merah-Putih Orthodontic Compass* aids the operator in establishing a straight line parallel to the tragus-ala nasi line and guides the appropriate adhesive thickness for bracket application. The ala-tragus line, defined as a line extending from the inferior border of the nasal ala to the tip of the tragus of the ear, exhibits the most significant correlation with the natural occlusal plane.[10–12]

Figure 5: Compass is used as a reference when bonding brackets to posterior teeth.

A dental professional may start by installing brackets on one side if placing them on all sides at once is difficult. After the operator has finished installing brackets on the six posterior teeth on all sides, the installation of brackets for the anterior teeth can begin according to the principles of conventional bracket placement. The installation of posterior brackets performed with the *Merah-Putih Orthodontic Compass* can serve as a reference for determining the height of bracket placement on the anterior

teeth.

4. Conclusion

Orthodontic treatment requires increasingly longer timeframes as more teeth are considered for movement. Reducing the number of teeth being moved by focusing solely on the anterior teeth can be considered one way to expedite orthodontic treatment, especially for patients who only have concerns regarding the alignment of their anterior teeth and have relatively good posterior tooth alignment. The anterior teeth significantly impact an individual's self-confidence, leading many patients to seek dental enhancement for them. The *Merah-Putih Orthodontic Compass* is expected to serve as a useful tool in orthodontic treatment that focuses on the anterior teeth while still involving the posterior teeth as anchorage.

5. Source of Funding

None.

6. Conflict of Interest

None.

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