

Orthodontic Bracket Adjustable In Different Angles

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Abstract

Modern advancements in dentistry, like as laser technology and digital dentistry, are increasing the comfort and effectiveness of dental procedures. Dental lasers, for instance, can now be utilized more precisely and less invasively for treatments like gum contouring and cavity elimination. The orthodontic brackets with adjustable angles, presenting a paradigm shift in orthodontic treatment. These brackets offer unprecedented versatility, enabling orthodontists to customize treatment for diverse cases with unique tooth anatomy and complex malocclusions. The adjustable feature enhances precision and efficiency in tooth movement, potentially reducing treatment time. While promoting improved patient comfort through a tailored approach, the technology demands specialized training for effective utilization. The advantages include enhanced versatility, precision, and potential for more efficient outcomes. However, considerations of complexity, maintenance, and associated costs underscore the need for careful assessment and training in incorporating these innovative brackets into orthodontic practice. Overall, adjustable angle brackets signify a promising advancement, balancing customization with practical considerations for optimal orthodontic care.

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Introduction

Orthodontic therapy is a specialized branch of dentistry focused on diagnosing, preventing, and correcting misaligned teeth and jaws. Utilizing various devices such as braces, aligners, and retainers, orthodontists aim to improve both dental aesthetics and functionality. The treatment addresses issues like malocclusions, overcrowding, and bite irregularities, enhancing oral health and overall well-being¹. Orthodontic therapy goes beyond cosmetic benefits, as it can alleviate problems like speech difficulties and jaw pain. Tailored treatment plans, often spanning months to years, guide the gradual alignment process. Continuous

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advancements, including clear aligner technologies, contribute to more discreet and comfortable options, making orthodontic therapy an accessible solution for diverse patients².

Orthodontic therapy incorporates both removable and fixed modalities to rectify dental misalignments. Fixed options, such as traditional or lingual braces, afford precise control through permanent attachment³. Conversely, removable alternatives, exemplified by Invisalign clear aligners, provide flexibility and aesthetic appeal, proving effective in diverse cases. Recent studies underline the importance of personalized treatment plans for optimal outcomes⁴.

Fixed orthodontic therapy, such as traditional braces, offers several advantages over removable alternatives. The fixed nature ensures continuous correction, providing constant force for more complex cases of misalignment or severe malocclusions. This permanence leads to a higher level of control

by orthodontists, facilitating precise adjustments throughout the treatment. Additionally, fixed appliances are less dependent on patient compliance, as they are not removable, reducing the risk of inconsistent wear and treatment delays. These braces are particularly effective in cases requiring extensive realignment, providing a reliable and steady approach for achieving optimal results in orthodontic correction⁵.

Traditional orthodontic brackets have been a fundamental component in orthodontic treatment for decades. These brackets typically consist of metal or ceramic and are affixed to the teeth to facilitate the attachment of archwires. The design includes slots to hold the archwire securely, guiding tooth movement over time. The brackets are strategically placed to address specific malocclusions and achieve the desired alignment⁶.

Traditional brackets are known for their durability and effectiveness in treating various orthodontic issues, including misalignments and bite problems. They work in conjunction with other components like bands and wires to apply controlled pressure on the teeth, gradually moving them into the desired positions. While they may lack the aesthetic appeal of newer alternatives, their robust design and proven efficacy continue to make them a widely used option in orthodontic practice.

Orthodontic brackets that are adjustable in different angles offer a versatile solution for orthodontic treatment. These brackets are designed to accommodate variations in tooth anatomy and alignment, allowing orthodontists to customize the angle of the brackets based on individual patient needs. The adjustability feature enhances precision in tooth movement, addressing specific malocclusions effectively. This flexibility also contributes to improved patient comfort, as the brackets can be tailored to minimize irritation and enhance overall treatment experience⁷. Additionally, the ability to adjust angles facilitates optimal force distribution, supporting more efficient and accurate orthodontic outcomes. Overall, orthodontic brackets with adjustable angles represent a valuable advancement in orthodontic technology.

Methodology

This invention was patent by Saudi Authority for intellectual Property on 29th September 2022. The patent number is SA 11012. The current invention describes orthodontic brackets with several modifications to resolve the issue of fully expression of root torque. The first modifications are separation of the brackets of its mesh (Fig 1, 2). The bracket is designed to be attached to its mesh by clips, an upper clip and lower clip. When the upper clip is released, the brackets are angulated clockwise, and the angle of the wires lot will be increased, and this will result in more palatal root torque (Fig 3-9). The opposite is right when the lower clips is released, the bracket will be angulated counterclockwise, and this will lead to decrease in the wire slot angle which makes the root move labially (Fig 5,6).

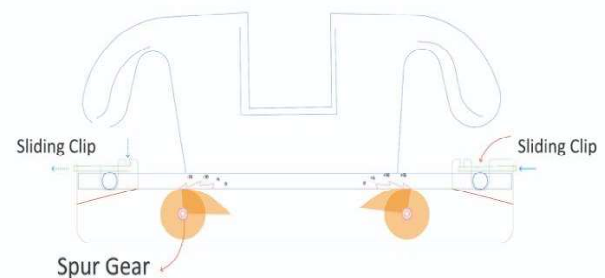


Fig 1. Side view of innovated bracket

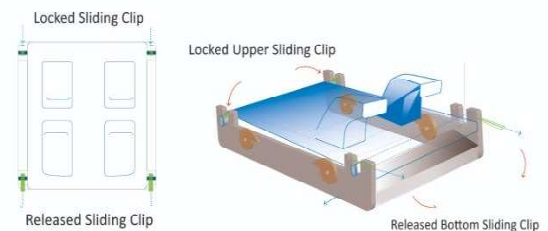


Fig 2. The design of bracket mesh and top view of the innovated bracket.

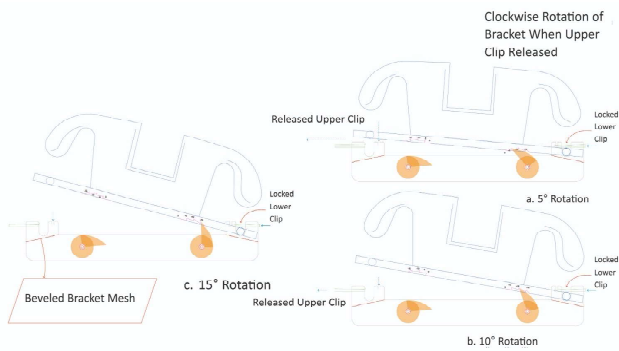


Fig 3. Illustration of increasing bracket torque.

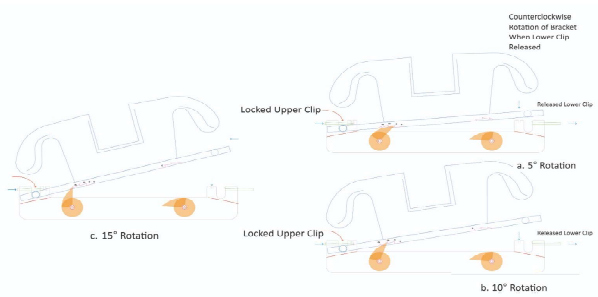


Fig 4. Illustration of decreasing bracket torque.

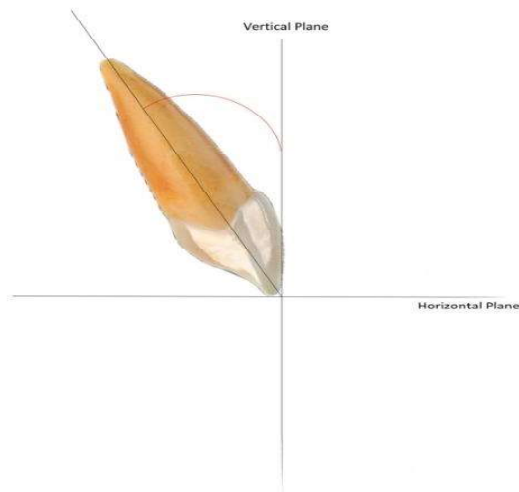


Fig 5. Labial root torque when bracket is released from bottom

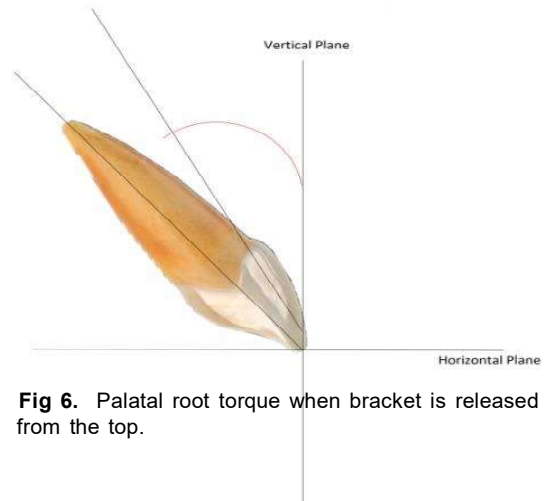


Fig 6. Palatal root torque when bracket is released from the top.

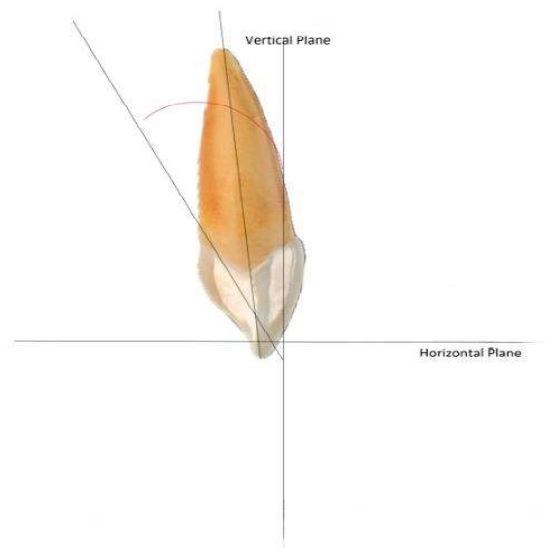


Fig 7. Positive root torque inclination relative to vertical & horizontal referral lines

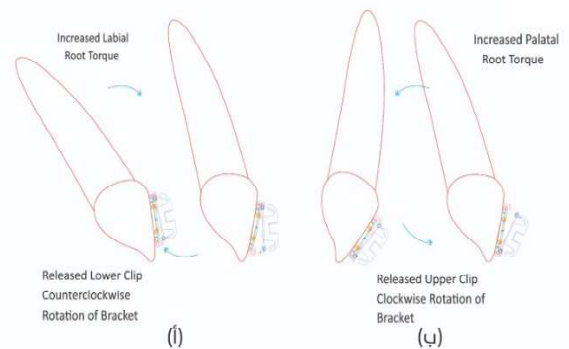


Fig 8. Negative root torque inclination relative to vertical & horizontal referral lines

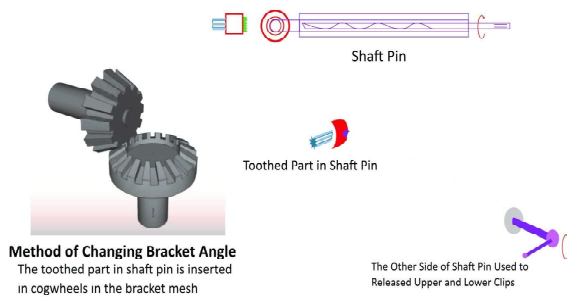


Fig 9. Method of increasing angle degrees by using shaft pin, the toothed part in the shaft pin and design of cogwheel.

Discussion

The present invention generally relates to orthodontic brackets it relates to orthodontic brackets that are adjustable at different angles. It is known that the teeth consist of a visible part in the mouth, the crown, and another part embedded inside the jaw bone, the root. To obtain the best occlusion of the teeth and an attractive smile appearance, the roots of the teeth must be positioned at specific angles in comparison with the plane horizontal line and the vertical line. As shown in Fig 6. In cases of crowded, tilted or protruding teeth, the orthodontist adjusts the alignment and arrangement of the teeth based on the relationship of the crowns of the teeth to each other. As for the occlusion of the upper teeth with the lower ones and the formation of the smile arch, it depends very much on the angle of inclination of the teeth roots. Orthodontics is considered one of the fields of dentistry that is concerned with studying and treating malocclusions. In conventional orthodontic treatment, the Orthodontist place and bond the orthodontic brackets on the patient's teeth and then engage the arch wires in the slots of the brackets⁸. The wires express the needed orthodontic force on the tooth to move it to the correct position. As orthodontic goals and techniques continue to develop, many orthodontic brackets were suggested. Current orthodontic brackets are designed at a globally specific angle for each tooth separately (Root Torque). However, reaching these angles or expressing the full prescription by wires alone is not possible because of the space or degree of play between wires and slots. Therefore, orthodontists solve this problem by

process called wire bending. The wires are bended to obtain the required torque of the root. If you want to move the root more palatally, the wire is bended more palatally and vice versa.

Orthodontic brackets that are adjustable in different angles represent an innovative approach in orthodontic treatment, providing orthodontists with a tool to customize treatment based on individual patient needs. The ability to adjust the angles of these brackets offers several indications, advantages, and considerations.

Adjustable angle brackets are particularly useful in cases where there are variations in tooth anatomy and alignment. Patients with complex malocclusions or irregularities in tooth shape and size can benefit from the customized angulation of these brackets. This flexibility allows orthodontists to address specific challenges in tooth movement, providing a more tailored and precise treatment approach.

The advantages of using adjustable brackets are versatility, precision, improved comfort and efficiency. Adjustable brackets enhance versatility in treatment planning, accommodating the unique needs of each patient. Orthodontists can fine-tune the bracket angles to optimize tooth movement. The ability to customize the angle of the brackets allows for more precise control over the force applied to each tooth⁹. This precision is crucial for achieving optimal results in orthodontic correction. Customizing the bracket angles can contribute to improved patient comfort. By aligning the brackets more precisely with the teeth, the risk of irritation and discomfort is minimized. The adjustable feature facilitates efficient and effective tooth movement, potentially reducing treatment time. Orthodontists can make real-time adjustments, adapting the treatment plan as needed.

Despite of having multiple advantages this device may have some disadvantages like complexity, cost and maintenance. The adjustable nature of these brackets may introduce additional complexity to the treatment process. Orthodontists need specialized training to effectively utilize and adjust

these brackets. Orthodontic brackets with adjustable angles may be associated with higher costs compared to traditional brackets¹⁰. The investment in these advanced brackets should be considered in the context of the overall treatment plan. The adjustable components may require more meticulous maintenance, and patients may need to be more vigilant in adhering to oral hygiene practices to prevent issues related to the moving parts.

Choose adjustable angle brackets for precise orthodontic treatment tailored to individual needs. Ideal for cases with varied tooth anatomy, these brackets enhance versatility and efficiency. Ensure orthodontists receive proper training for effective use, balancing the benefits of customization with associated complexities and costs.

Conclusion

In conclusion, orthodontic brackets adjustable in different angles offer a valuable tool for orthodontists, allowing for customized treatment plans and enhanced precision. While they present several advantages, careful consideration of the associated complexities and costs is essential to determine their appropriateness for each patient.

Conflict of Interest

Authors have no conflict of interest and no grant funding from any organization.

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