Indonesian Journal of Dental Medicine
Volume 7 Issue 2 2024; 57-59

Research Report

Comparison of arch length and width in the angle Class II malocclusion with extraction and non-extraction in the Dental Hospital Universitas Airlangga

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ABSTRACT

Background: Depending on the disparity seen, orthodontic treatments frequently take into account the possibility of tooth extraction or non-extraction. Class II Angle malocclusion cases are the specific emphasis of this study, whereas Class I Angle malocclusion patients were the focus of earlier research. **Purpose:** Examining how tooth extraction and non-extraction therapies affect arch length in patients with Class II Angle malocclusion is the goal. **Method:** Arch length was measured using pre- and post-treatment models of individuals with Class II Angle malocclusion who had extraction and non-extraction treatments. To find out if there were any notable variations, the collected data was analyzed. **Results:** The maxillary and mandibular arch lengths in the extraction group were significantly different before and after orthodontic treatment ($p<0.05$). Likewise, the the widths of the mandibular and maxillary arches before and after orthodontic treatment were significantly different ($p<0.05$). The maximum and arch length in the non-extraction group had a signifiant different before and after orthodontic treatment ($p<0.05$). **Conclusion:** the sagittal arch length decreased in both extraction and non-extraction treatments, the arch width decreased in extraction treatments, and the arch width increased in non-extraction treatments. In patients with Class II malocclusion, there are notable changes in the sagittal arch width and length before and after orthodontic treatment, whether extraction or non-extraction. Compared to the non-extraction treatment group, the extraction treatment group experienced more substantial alterations in sagittal arch length and width.

Keywords: arch length; extraction; medicine; orthodontic; malocclusion

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INTRODUCTION

The study of orthodontics is a branch of dentistry that focuses on malocclusion correction. There is a normal range of variation in malocclusion. Patients continue to seek therapy to treat their crooked teeth and are learning more about orthodontics to improve treatment outcomes, despite the fact that malocclusion is a condition that falls within the spectrum of natural variation.[1,2] Because malocclusion can cause disturbance in the temporomandibular joint, affect speech, swallowing, and chewing, it might be problematic for certain individuals. Despite the fact that both function and beauty are intended to be improved by orthodontic treatment, facial harmony is currently the primary focus.[3–5]

Malocclusion is a condition of intracraniofacial growth deviation that affects facial compatibility, appearance, chewing function, swallowing, and speaking.[6] It is brought on by anomalies in the amount, form, and placement of the tooth in the curve over the normal limit. Problems with the teeth (dental), jaw bones (skeletal), jaw and tooth combinations (dentoskeletal), chewing muscles (muscular), or soft tissues can all contribute to malocclusion. Inherited, congenital, and environmental factors can all contribute to the development of malocclusion. These three components may involve soft networks and interact with one another.[7–9] In this study, the length and width of the curve were measured in patients with Angle II malocclusion both before and after extraction and non-extraction treatments as the aim of this study.

MATERIALS AND METHODS

Analytical-observational research is what this kind of study is. Using a cohort study design, this study examined changes in arch length and arch width before and after treatment for two groups that were exposed differently: class II malocclusion patients who received extraction treatment and class II malocclusion patients who did not receive extraction treatment. The incisal point in the front and the midpoint of the imaginary line joining the distobuccal cusp

DOI: https://doi.org/10.20473/ijdm.v7i2.2024.57-59

of the right and left second molars were used to measure the arch's length. It is possible to determine the arch width by measuring the distances between the canines, premolars, and molars.

The crests of the left and right canine cusps were used to determine the distance between the canines. The buccal cusp crests of the left and right premolars were used to quantify the inter-premolar distance. The mesiobuccal cusp apex of the left and right molars was used to estimate the intermolar distance. Based on the following criteria, the research sample was selected from secondary data of Dental and Oral Hospital patients at Universitas Airlangga's Faculty of Dental Medicine: Deutro-Malay race, diagnosis of class II division 1 or 2 malocclusion, age greater than 15 years, and use of a study model after and before treatment. Based on inclusion and exclusion criteria, the total sampling technique was used for the sampling process. Purposive sampling was the sample strategy employed in this study, whereby the medical records of patients undergoing orthodontic treatment were chosen based on the inclusion criteria. Pencils, erasers, vernier calipers, rulers, computers, and study models before and after orthodontic treatment with extraction and non-extraction in patients with class II malocclusion were among the equipment and supplies utilized in this investigation. Statistical analysis was done using statistical package of social science (SPSS) to examin the difference between groups using independent t-test ($p<0.05$).

RESULTS

Medical records and study models from orthodontic patients with class II malocclusion who received both extraction and non-extraction treatments were gathered for the study. From the incisal point anteriorly to the midpoint of the hypothetical line joining the distobuccal cusp of the right and left second molars posteriorly, the arch length was measured anteroposteriorly in both the pre-treatment and post-treatment models. The measurement findings are then compared to see if there are any variations between extraction and non-extraction therapies before and after treatment.

According to the descriptive analysis's findings, the maxillary sagittal arch length changed by an average of -0.4952 and the mandibular sagittal arch length by an average of -0.2571 during the extraction therapy. A negative value denotes a decrease. The average change in mandibular arch width was -0.4381, and the average change in maxillary arch width was -0.3952. A reduction is indicated by a negative value. A decrease is indicated by a negative value. The average change in maxillary sagittal arch length in the non-extraction treatment was -0.1571, while the average change in mandibular sagittal arch length was -0.1429. A positive result implies an increase, while the average change in mandibular arch width was -0.2429 and the average change in maxillary arch width was 0.2571. The maxillary and mandibular arch lengths in the extraction group were significantly different before and after orthodontic treatment ($p<0.05$). Likewise, the the widths of the mandibular and maxillary arches before and after orthodontic treatment were significantly different ($p<0.05$). The maximum and arch length in the non-extraction group had a signifiant different before and after orthodontic treatment ($p<0.05$).

DISCUSSION

In order to improve mastication and attractiveness, orthodontic therapy aims to change patients' initial malocclusions into normal occlusions. Andrews established six criteria for appropriate occlusion: a normal curve of speech; a molar relation neutroclusion; tooth angulation that tends to mesially; a tooth inclination that is neither too labial nor too palatal; no diastema; and no rotation.[10] Class II malocclusion is frequently linked to issues with the inclination of the teeth. To correct the tooth's inclination, the anterior teeth must have adequate space to be positioned correctly. Patients with class II malocclusions may have so little space that extractions and orthodontic treatment are necessary.[11–14]

Alterations in facial profiles are linked to orthodontic therapy that involves extractions. Examined from the anteroposterior side, the facial profile is an extraoral examination. Face profile associated with the length of the sagittal curve or the anteroposterior dimensions of the ligament curve. Furthermore, the size of the buccal corridor—the vacant area on the right and left buccal sides of the teeth that is apparent when smiling—is also connected to it. The buccal corridor can impact the smile's appearance and is correlated with the arch's width.[15]

In class II malocclusion patients, this study sought to determine whether orthodontic treatment involving extraction or non-extraction could impact the dental arch's dimensions, specifically the anteroposterior dimension (the sagittal arch's length) and the horizontal dimension (the arch's width). In this study, class II malocclusion patients who underwent orthodontic treatment with extraction and non-extraction had their sagittal arch length and width measured. Following extraction therapy, the length of the maxillary and mandibular sagittal arches in this study considerably decreased. The maxillary sagittal arch's length was shown to have significantly decreased in the non-extraction treatment, indicating that the change in extraction treatment was greater than the change in non-extraction treatment, even though both the extraction and non-extraction groups showed a significant decrease between before and after treatment.[16,17]

Sagittal arch length decreased in both extraction and non-extraction treatments, but arch width decreased in extraction treatments and increased in non-extraction treatments, according to this study. There are notable differences between the sagittal arch width and length in patients with Class II malocclusions before and after orthodontic treatment, whether extraction or non-extraction. The extraction treatment group experienced more substantial

DOI: https://doi.org/10.20473/ijdm.v7i2.2024.57-59

alterations in both sagittal arch width and length than the non-extraction treatment group did.

ACKNOWLEDGEMENTS

The author appreciates the support and help of the Faculty of Dental Medicine, Universitas Airlangga and Orthodontic Clinic, Dental and Oral Hospital Universitas Airlangga.

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DOI: https://doi.org/10.20473/ijdm.v7i2.2024.57-59