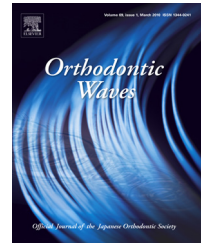


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Original article

Transverse adjustment of preformed stainless steel archwires to the dental arch form

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ABSTRACT

Purpose: Stable orthodontic treatment results require the preservation of the pretreatment mandibular dental arch form. Therefore, this study aimed to evaluate the amount of transverse adjustment of preformed stainless steel archwires require to fit the dental arch form.

Materials and methods: A fourth-order polynomial curve was applied to the 30 normal mandibular dental arches, and interpolated widths at the mean depths at the canine, first and second premolars, and first molar were measured. Widths of 42 types of 0.016-in. stainless steel preformed archwires were measured at the same mean depths. The widths of the dental arch and archwires were compared by the Mann-Whitney U test. Transverse adjustment values as the difference between dental and archwire widths for each tooth from the canine to first molar were calculated for each archwire and compared between tooth types. Correlation coefficients between tooth types were also analyzed.

Results: Preformed archwire width was significantly narrower than the dental arch. Significant difference between transverse adjustment values between each tooth type were found except between canine and first premolar. Significant correlations between each tooth types were also observed.

Conclusion: To reduce these adjustments, preformed stainless steel archwires that are designed to be approximately 1-2mm at the canine, 1-3mm at first premolar, 2-4mm at second premolar, and 3-6mm at first molar wider in the transverse dimension could be clinically recommended.

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1. Introduction

To achieve stable orthodontic treatment results, preserving the pretreatment mandibular dental arch form of each patient has been emphasized [1-5]. For the edgewise technique, the importance of adjusting archwires to individual dental arch forms was recognized early in the 20th century [6-9]. In the

1970s, when the straight wire appliance was developed by Andrews based on an extensive dental cast study [10], a new generation of archwire form was also designed for this system, but was largely based on clinical experience [11].

Preformed stainless steel archwire blanks for both standard and preadjusted edgewise techniques have become popular and a variety of products are currently available [12,13]. Clinically, stainless steel preformed archwire blanks are almost always

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adjusted in the transverse dimension to fit the pretreatment dental arch form of individual patients [14,15]. Nonetheless, few studies to date have evaluated the variation in the width of stainless steel preformed archwires and the amount of transverse bending required when adjusting these products.

Felton et al. [16] compared 17 types of preformed NiTi archwires with a total of 90 untreated normal, Class I, and Class II cases, and observed that no single archwire form fit every mandibular dental arch. They suggested the importance of

customization in most cases to obtain stable results. Subsequent studies by Oda et al. [17] and Saze and Arai [18] compared the mandibular dental arches of 30 untreated subjects with normal occlusion to 20 and 34 types of preformed NiTi archwires, respectively. They found that the median width of the preformed NiTi archwires was significantly narrower than the median dental arch width. Other studies compared the mean preformed NiTi archwire width to the mean dental arch width measured by fitting the beta function curve, and found the mean archwire

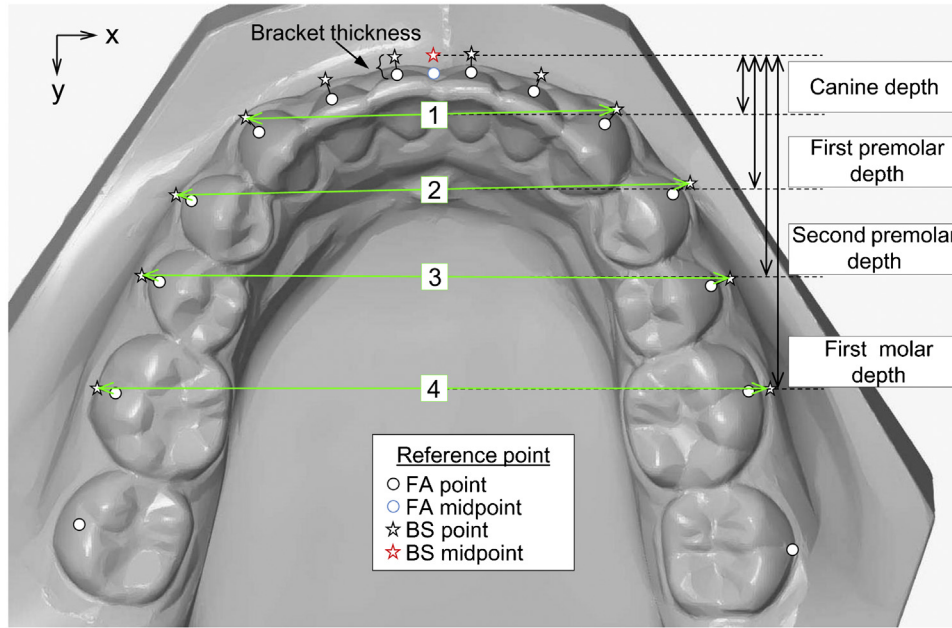


Fig. 1 – Measurements of dental arch depth and BS point width: (1) BS point width at canine, (2) BS point width at first premolar, (3) BS point width at second premolar, and (4) BS point width at first molar.

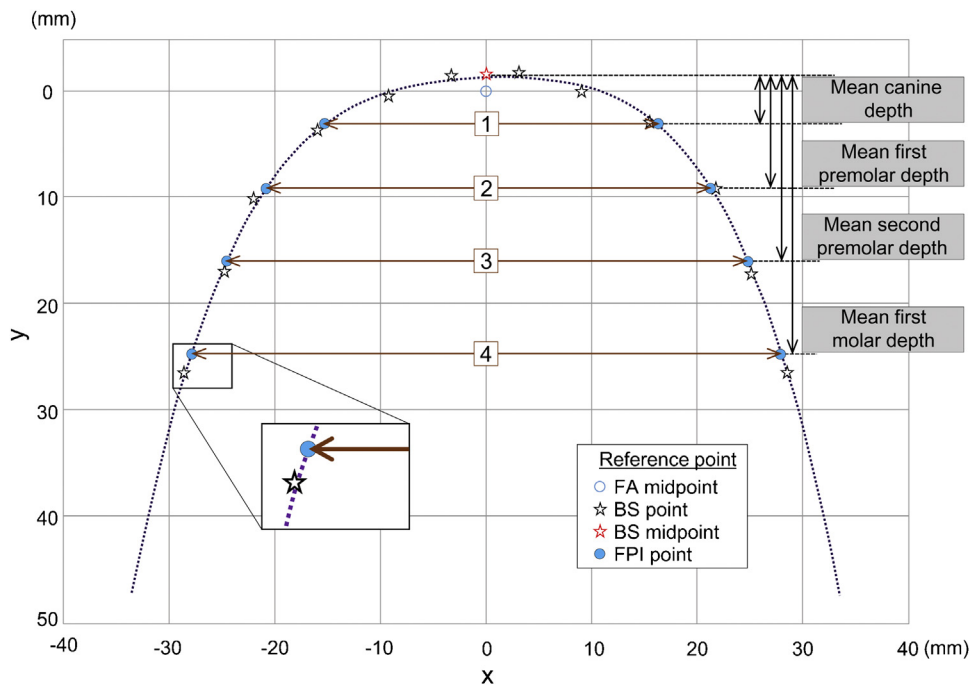


Fig. 2 – Measurements of FPI point width using mean depths applying fourth order polynomial equation to normal dental arch (1) FPI point width at canine, (2) FPI point width at first premolar, (3) FPI point width at second premolar, and (4) FPI point width at first molar.

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