UNIVERSITI TEKNOLOGI MARA

COMPARISON OF THREE METHODS OF ORTHODONTIC ANCHORAGE: A PROSPECTIVE STUDY

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Dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Clinical Dentistry
(Orthodontics)

Faculty of Dentistry

February 2019

ABSTRACT

The usage of TPAs and MIs in reinforcing orthodontic anchorage is well known. However, lack of study has been conducted to assess the effectiveness of TPA-Nance. Therefore, this study was conducted to compare the clinical effectiveness of three methods of anchorage; TPA, TPA-Nance, MI in the treatment of patients with malocclusion that required orthodontic anchorage. The effectiveness was measured by looking at the mesial movement of maxillary first permanent molar or known as anchorage loss during the period of maxillary canine retraction. In addition to that, the duration of treatment, cost of the appliance and patients' oral health related quality of life (OHRQoL) towards the anchorage supplementation were taken into consideration. Thirty-six orthodontic subjects aged between 18 and 30 years old who required anchorage regime were recruited and they were equally divided into three groups. All the subjects received the allocated anchorage regime and subsequently, extractions of the maxillary first premolars were carried out, followed by provision of upper and lower fixed appliances. The clinical endpoint was Class I canines relationship bilaterally. Subjects' OHRQoL were measured a week after the insertion of the allocated anchorage regime. There was a statistically significant difference in anchorage loss between the three anchorage groups (***p*<0.001**). The highest amount of anchorage loss was seen in TPA group with 2.19 mm (SD 0.53) and 2.25 mm (SD 0.56) for right and left molar respectively. Meanwhile, TPA-Nance group showed anchorage loss of 1.23 mm (SD 0.22) right molar and 1.25 mm (SD 0.21) on left molar. On the other hand, MI had the lowest anchorage loss with mean of 0.33 mm (SD 0.23) and 0.11 mm (SD 0.17) on right and left molar respectively. There was a statistically significant difference in the treatment duration to achieve Class I canine relationship (***p*<0.05**). TPA took the longest treatment time with 15.8 months (SD 3.5). The treatment duration with TPA-Nance was 13.8 months (SD 2.4). While MI was the shortest treatment with 11.9 months (SD 1.8) to achieve Class I canine relationship bilaterally. Apart from that, the S-OHIP-14 questionnaire analysis showed patients' OHRQoL not significantly affected regardless of the anchorage regimes ($p>0.05$). In this study, the MI cost twice as much as the cost of TPA and TPA-Nance. If the MI had shown the least anchorage loss with rapid treatment duration, it may be cost savings. However, TPA-Nance also demonstrated of acceptable in controlling the anchorage with less than 2.0 mm of anchorage loss and it only cost RM 20 more when compared to TPA, hence, it would seem to represent good value for money. From the results obtained, all the anchorage regimes are effective for reinforcing orthodontic anchorage. However, TPA-Nance might be the suitable alternative method in reinforcing anchorage because it provides less anchorage loss in shorter treatment duration with reasonable price.

ACKNOWLEDGEMENT

Firstly, I wish to thank Allah for giving me the opportunity to embark on my DClinDent in Orthodontics and completing this long and challenging journey successfully. My gratitude and thanks go to my supervisor, Dr Maryati Md Dasor, and co-supervisor, Dr Saraswathy Devi Sinniah. Thank you for the support, patience and ideas in assisting me with this project.

I would like to express my great appreciation to Malaysian government, specifically the Oral Health Division for making my dream come true.

Special thanks for my beloved husband and my son for their incessant sacrifice and prayers along the way. Not forgetting my beloved family, siblings for their endless love and for their never-ending support with this project. My appreciation goes to my colleagues, friends and staff of Tourmaline Clinic and Klinik Pergigian Jasmine, Centre of Paediatric Dentistry and Orthodontics Studies, dental technicians and everyone which their names are not mentioned.

Finally, this dissertation is dedicated to my beloved father and mother for the vision and determination to educate me. This piece of victory is just the beginning of my new adventurous life.

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CHAPTER ONE
INTRODUCTION

1.1 Research Background

Orthodontic anchorage can be defined as the resistance to unwanted tooth movement (Proffit et al., 2007). Anchorage is an important consideration when planning orthodontic tooth movement and the main factors for determining the success of orthodontic treatment (Prabhu & Cousley, 2006). A well-planned anchorage selection will help the orthodontists to determine the type of mechanics that they want to use.

Despite the anchorage arrangement, unwanted tooth movement known as loss of anchorage can have a detrimental effect on the treatment outcome (Geron et al., 2003). The ideal treatment is to achieve absolute anchorage, however, according to Newton's third Law of Motion for every action there is an equal and opposite reaction. Therefore, it is impossible to create absolute anchorage without any opposite movement (Chetan et al., 2014). For many decades, orthodontists and scientists have tried to develop new methods and techniques to prevent anchorage loss.

In the earlier years, HG was widely used as extra-oral anchorage to prevent anchorage loss especially in maximum anchorage requirement cases (Li et al., 2011). However, the use of HG have been associated with facial injury and depends highly on the patient's compliance (Seel, 1980). Alternatively, intra-oral appliances have been introduced as anchorage reinforcement, such as, Nance appliance or TPA and currently, MI.

Various studies have been conducted to assess the effectiveness of the appliances. Sandler et al. (2014) evaluated and compared the anchorage reinforcement between three methods of anchorage; the TADs, Nance button palatal arches and HG. There was no significant difference in the effectiveness between the three anchorage groups in terms of anchorage support but TADs and Nance palatal arch were preferable because the usage does not rely on the patient's compliance.