CHAPTER I

INTRODUCTION

1.1 Introduction

Open configuration is one of complicated malocclusions, usually characterized by excessive growth of the posterior dentoalveolar heights. Apparently, orthognathic surgery should be performed in severe cases. In borderline cases, camouflage treatment should be considered for dental compensation. In some particular cases, treatment stability and esthetic outcome are compromised, if the anterior open bite is closed by incisor elongation. So, molar intrusion is advantageous. Several methods have been used to intrude posterior teeth, including bite blocks with/without active parts, extraoral modalities, and multiloop edgewise appliances, although satisfactory results would be difficult to be achieved. Recently, miniscrew implants have been used as the skeletal anchorage during orthodontic tooth movement, molar intrusion included.[1-2] Miniscrew implants are anticipated to be stable during treatment period. Stability of miniscrew implants could be invasively assessed by histomorphologic and histomorphometric assessments, removal torque measurement, and pull-out strength test. Failures of miniscrew implants can be clinically detected if only hypermobility and extensive peri-miniscrew implant bone loss are developed. Thus, early detection of miniscrew implant failure is worthy. This may be carried out *via* biochemical assessment.

The analysis of specific constituents of the gingival crevicular fluid, for example, inflammatory mediators, tissue-breakdown products, and host-derived enzymes, may provide quantitative biochemical indicators for local cellular metabolic activity.[3] Alkaline phosphatase, a host enzyme involved in bone metabolism, has been shown to be significantly elevated in inflamed sites and mentioned as a possible predictor of attachment loss in periodontitis.[4-5] Level alterations of alkaline phosphatase have been also recognized in orthodontically treated teeth[6-9], since the mechanical force triggers the biologic responses, resulting in acute inflammatory process.[10] As no difference of the gingival crevicular fluid volume observed between in natural teeth and dental implant sites, the features of inflammation seem to be similar around teeth and implants.[11] Dramatically raises of alkaline phosphatase activity were also observed in peri-implant crevicular fluid and could be a promising biomarker of peri-implantitis.[12-13]

At the biomolecular level, Sari and Uçar monitored levels of interleukin-1ß around miniscrew implants during canine retraction. The result indicated that mechanical stress on healthy miniscrew implants did not affect the levels of interleukin-1ß in peri-miniscrew implant crevicular fluid.[14] Presumably, tissue responses around miniscrew implant might resemble peri-implant tissue. Therefore alkaline phosphatase activity around peri-miniscrew implant might behave like that around dental implants. Unless inflammation occurred, the alkaline phosphatase level should not be increased, and vice versa. So the alkaline phosphatase levels in crevicular fluid around miniscrew implants and teeth should be monitored during orthodontic molar intrusion in this study.

1.2 Purpose of this study

To monitor alkaline phosphatase levels in crevicular fluid around maxillary molars and miniscrew implants during orthodontic molar intrusion.

1.3 Anticipated benefits

The data from this study may help clinicians or researchers to evaluate the molar intrusion by monitoring the level of alkaline phosphatase in gingival crevicular fluid. Optimum force may be clarified how much the threshold of force magnitude should apply to switch on molar intrusion for each individual. Stability of miniscrew implant may be determined from assessing the constituents of peri-miniscrew implant crevicular fluid. Results of this study may give information for the future study in related topics.