

CHAPTER I INTRODUCTION

STATEMENT AND SIGNIFICANCE OF THE PROBLEM

External apical root resorption (EARR) of permanent teeth can be induced by various factors, for example, pressure from an adjacent impacted tooth, periapical or periodontal inflammation, tooth implantation or replantation, continuous occlusal trauma, tumors or cysts, metabolic or systemic disturbances, local functional or behavioral problems, orthodontic treatment and idiopathic factors.¹

EARR can occur in orthodontically moved teeth. Single-rooted anterior teeth are at greater risk of experiencing EARR than are multi-rooted posterior teeth, because the root surface area of multi-rooted teeth for the dissipation of forces is greater than that of single rooted teeth. On the other hand, teeth in the anterior segment are moved greater distances, on average, during treatment than are posterior teeth, so the greater loss of root length in the incisors may be the result of a combination of both factors, root surface area and the distance moved.²

Sameshima and Sinclair³ examined full mouth periapical radiographs and treatment records from 868 patients. They found EARR occurs mainly in the anterior teeth. The average amount of resorption found for molars and premolars was very low (less than 1 mm). The worst resorption was seen in maxillary lateral incisors, followed by maxillary central incisors, maxillary canines, mandibular canines, mandibular central incisors, and mandibular lateral incisors.

Many reports in the orthodontic literature studied EARR after full fixed edgewise orthodontic treatment. Most studies examined root resorption in maxillary incisors because a greater amount of root resorption occurs there. The mean average EARR is 0.48-1.47 mm for maxillary central incisors and 0.59-1.63 mm for maxillary lateral incisors.³⁻⁷

Brezniak and Wasserstein,^{8,9} in their meticulous review, have reported that many factors are involved in various degrees of EARR. Most of these factors are not definitive factors causing EARR, but a number of factors taken together may explain

why resorption takes place. However, few studies have reported on incidence or on factors related to EARR in Asian populations, especially those in Thailand.

The risk of maxillary incisor mobility is increased when the teeth undergo severe EARR. Levander and Malmgren⁶ studied seventy three maxillary incisors in twenty patients (aged 20-32 years at the beginning of the study) with severe orthodontically induced root resorption for 5-15 years. They found that the risk of maxillary incisor mobility was increased when the remaining total root length was less than 9 mm. Therefore, knowing the causal factors would allow the clinician to predict the incidence, location and severity of EARR before the commencement of orthodontic treatment.

PRINCIPLES, THEORY, RATIONALE, AND HYPOTHESIS

Recently, EARR associated with orthodontic treatment has received considerable attention because of medicolegal exposure. Loss of apical root material is unpredictable and irreversible when extending into the dentine. If extensive orthodontic root resorption occurs, it could compromise the benefits of a successful orthodontic outcome.

Although the orthodontic literature contains many reports of EARR, there are few studies in the Asian population. Therefore, it would be valuable if we were to know the causal factors, both pre-treatment and treatment factors, associated with EARR.

OBJECTIVES

1. To evaluate the incidence and degree of EARR in maxillary incisors after orthodontic treatment.
2. To evaluate some associated factors related to EARR in maxillary incisors.

SCOPE OF THE STUDY

This study is a retrospective analysis which investigated the periapical radiographs of 564 maxillary incisors in 181 patients who completed orthodontic treatment at the post-graduate clinic of the Orthodontic Department at Chiang Mai University during 1995-2005.