ORIGINAL ARTICLE

POSSIBLE ADVERSE TISSUE REACTIONS RELATED TO ORTHODONTIC TREATMENT

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ABSTRACT

Periodic post-treatment clinical and radiographic examination of orthodontic patients showed root resorption, damage to the enamel surface, pulpal reaction, and damage to the periodontal tissues after orthodontic treatment. There were 40 study subjects: 28 females (70%) and 12 males (30%) between the ages of 17 year to 29 years. These subjects were selected for the study after the treatment was completed.

As there are no means to measure orthodontic forces, clinicians apply forces on the basis of their previous experience. Therefore, the forces applied are estimated forces. As the thickness and density of bone and the tooth tissues are different in each individual, so is the effect of forces. Another cause of tissue damage during orthodontic treatment is the bacterial plaque at the marginal gingiva. Because of difficulty of cleaning, there is a tendency for bacteria to collect under the orthodontic appliances.

Key words: *Periodontal tissue, bone resorption, alveolar bone, rapid maxillary expansion*

INTRODUCTION

During orthodontic treatment, changes in the tooth and surrounding structures occur, for example, in the periodontal ligament, alveolar bone, enamel, and gingiva. The severity of changes depend upon the amount of force, during and direction of force applied. Cementum has no blood and nerve supply but undergoes a process of deposition throughout its life, therefore it contributes to repair during orthodontic treatment. There can be periodontal and gingival inflammation due to orthodontic treatment. This is due to difficulty of brushing because of the placement of orthodontic appliances, resulting in an increased retention of plaque and food particles, responsible for inflammation and decalcification. The patients with fixed appliances can suffer from gingival inflammation, decalcification and plaque collection than the patients treated with removable appliances and non-orthodontics patients. There is also a greater loss of interproximal gingival attachment and bone on the molars because of sub gingival placement of bands.[14] There is also alveolar and marginal bone loss and gingival recession[12] (fig 3) due to orthodontic tipping forces pushing supragingival plaque subgingivally. There could be damage to the enamel surface, causing white spots on the banded or bonded tooth surface. Orthodontic tooth movement also cause root resorption.[11] It could be small superficial resorption that undergoes repair, or resorption at the root apex leading to root shortening.

METHODOLOGY

All the subjects were treated with fixed appliances. One subject was treated first with a rapid palatal expansion appliance, and then with an edge-wise technique. The treatment of all the subjects was completed over two and a half to three years before this study. Patients selected randomly and with their consent. The study was conducted by patient's examination, periapical and bite wing x-rays and photos were taken.

RESULTS

Of the 40 subjects, post treatment result was good in 25 (62%) of the subjects. There was no significant bone loss or root resorption. X-rays of 5 subjects (12.5%) showed root resorption (figs 1 & 2), approximately 2mm (grade one) at the apices of maxillary incisors 8

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subjects (20%) had marginal bone loss of maxillary molars and second bicuspids (fig 2). There was bone dehiscence, because the teeth move more rapidly with

Fig 1: Apical root resorption at the apices of maxillary central incisors after orthodontic treatment.

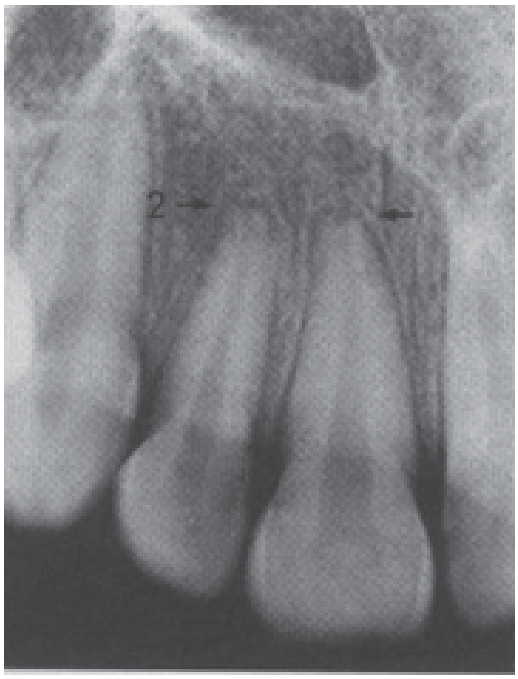

Fig 2: Root resorption at the apices of Central and lateral incisors after the orthodontic treatment.

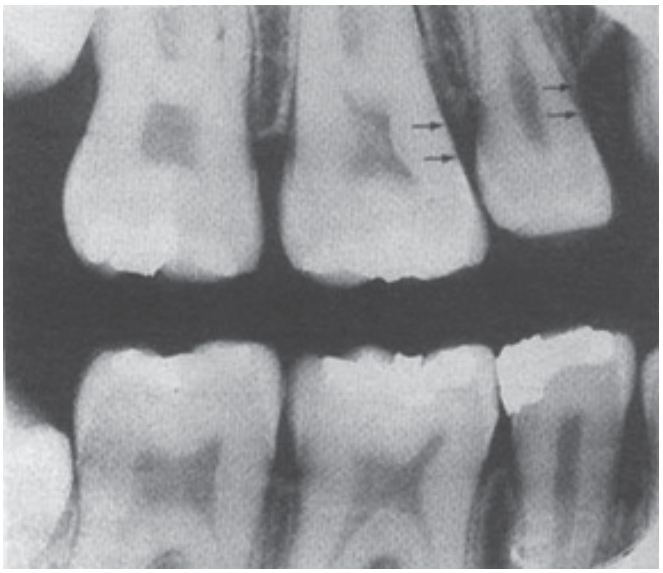

Fig 3: After orthodontic treatment showing loss of marginal bone support at the mesial surfaces of maxillary right 2nd premolar and first molar.

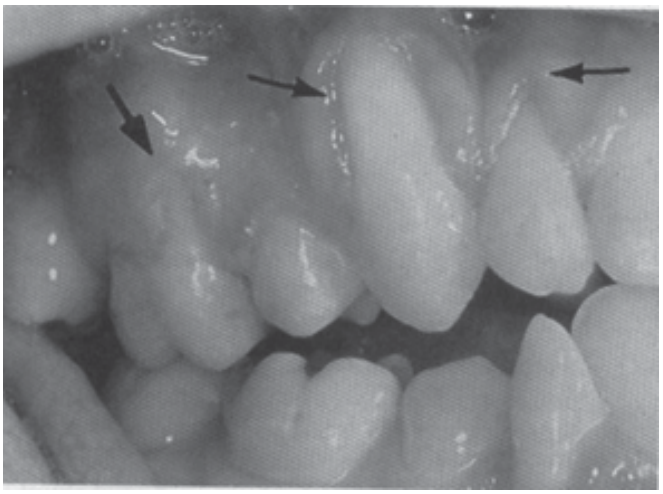

Fig 4: Bone dehiscence's at maxillary right canine and first molar using heavy orthodontic forces (arrows).

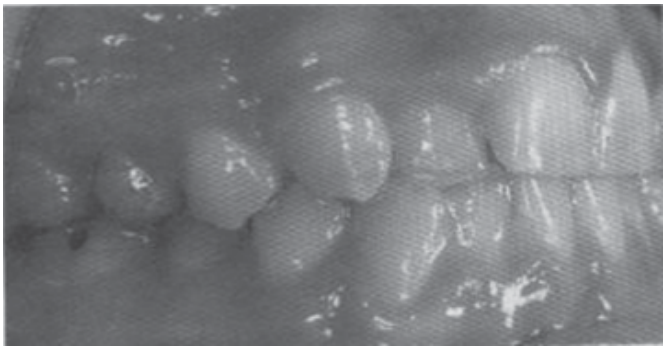

Fig 5: Relapse of maxillary right lateral incisor three years after completion of treatment.

the higher than the physiological forces (fig 4). Orthodontic forces have the tendency to recession in one subject (2.5%). One subject (2.5%) had a relapse, maxillary right lateral incisor went back into cross bite (fig 5), though to a lesser extent.

DISCUSSION

There are tissue changes during physiological tooth movement as with orthodontic treatment. However, the tissue changes with the orthodontic movement damage the periodontal tissue,[15] and there is alveolar and marginal bone loss, root resorption and gum recession. Gingival recession could be because of two reasons: one, inflammation of gingiva due to accumulation of plaque at the gingival margin and on the surface of enamel, causing not only the gingival recession (fig 3) but also white chalky patches on the enamel surfaces leading to decalcification and caries of the enamel surfaces. Therefore, proper oral hygiene during the treatment is very important, although difficult to maintain. Risk of decalcification could be reduced by good oral hygiene, fluoride rinses and patient and parent cooperation. Fluoride rinses reduce enamel decalcification and prevent plaque formation preventing bacterial enzyme activity.[16] Fluoride also helps in remineralization. Root resorption is common after orthodontic treatment. Frequency of root resorption depends on various factors, for example the type of appliances and forces used, duration of the treatment, extent of tooth movement and the age of the patient. Two types of root resorption occur with orthodontic treatment. Small superficial resorption that undergoes repair is clinically insignificant. Resorption at the root apex may cause root shortening.

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