Qualitative and Quantitative Evaluation of the Enamel Surface Following Different Reapproximation Techniques

A
Thesis

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Dedication

To My Dear Husband

& My Wonderful Family

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INTRODUCTION

In the last few years, orthodontists have shown particular interest in non-extraction therapy and consequently this has led to the increased popularity of enamel reapproximation technique as a mean of achieving this goal.

Enamel reapproximation is defined as the clinical act of removing part of dental enamel from the interproximal contact area.[1] This clinical procedure was commonly referred to as "stripping", but it has also been called "slandering," "slicing," "Hollywood trim," "selective grinding," "mesiodistal reduction," "reapproximation," "interproximal enamel reduction," "interproximal wear," and "coronoplasia."[2-4].

This technique has been introduced by Ballard[5] in the mid-forties. Since that time, it has been widely indicated in many clinical situations which included reshaping the proximal contact area in cases of tooth size asymmetry, solving Bolton discrepancy problems, treating mild or moderate crowding which in turn eliminated the need for extraction of permanent teeth in arch-length discrepancy cases. Additionally, it has been used for reshaping some teeth to improve finishing and dental esthetics, normalization of gingival contour and eliminating black triangular spaces between maxillary and mandibular incisors. Correcting the curve of spee through creating few millimeters of space in the arch and camouflage of class II and class III malocclusions could be possible by this technique.

The utilization of this technique has been contraindicated in few clinical situations including severe crowding (more than 8mm per arch), poor

oral hygiene and/or poor periodontal environment, small teeth and hypersensitivity to cold to avoid the appearance of or increase in dental sensitivity, susceptibility to decay or multiple restorations, square teeth with straight proximal surfaces and wide bases as reapproximation might produce broad contact surfaces leading to food impaction and reduction of interseptal bone.

Although enamel reapproximation is a well recognized clinical procedure, it has always been an issue of debate.

There were many arguments in favor of this technique stating that (1) continuous loss of tooth substance by attrition is a normal functional process, (2) adverse consequences of four premolar extraction, (3) flattening the contact surfaces of lower incisors will help resisting labiolingual crown displacement thus eliminating the need for lower retention, (4) more favorable overbite-overjet relationship is produced that improves anterior function in the mutually protected occlusion, (5) areas of interproximal gingival recession could be improved.

On the other hand, few arguments claimed that this technique had deleterious effect on enamel as it produced enamel furrows and scratches that were not removed by polishing. However, other studies failed to establish a significant relationship between enamel reapproximation and caries susceptibility.

Previous studies have shown several possibilities regarding the amount of enamel that could be safely reapproximated from proximal enamel, but it has been widely accepted that 50% of existing enamel was the

maximum amount that could be reapproximated without causing risk to dental and periodontal health. In most situations, this corresponded to 0.5 mm per dental surface.

Enamel reapprximation is carried out by different methods according to the previous orthodontic literature. These methods could be divided into two main categories, either manual or mechanical.

The manual method consisted of metallic strips impregnated with abrasive metal oxides and numerous holding devices. The use of this technique has diminished lately because it is time consuming, difficulty in working in posterior teeth, and some studies claimed that it produced deeper grooves than those caused by mechanical instrumentation.

The mechanical method consisted of hand- piece mounted diamond coated disks, tungsten-carbide or diamond burs mounted on high-speed hand-pieces as well as mechanical files for contra-angle heads.

The availability of various techniques, and our great concern on enamel integrity and health, inspired the idea of our study in order to investigate the changes in surface morphology, the degree of surface roughness produced and the amount of enamel removed from permanent teeth after various enamel reapproximation techniques.

REVIEW OF LITERATURE

Enamel reapproximation, also known as enamel stripping or interproximal enamel reduction (IER), is the removal and reshaping of enamel from the interproximal contact areas of adjacent teeth, most commonly the mandibular incisors. This reduction is often performed before, during or after orthodontic treatment, with either fixed or removable appliances. This procedure became widely used lately in many clinical circumstances such as creating spaces for alignment of crowded teeth, correcting tooth size discrepancies, giving teeth the suitable shape whenever there were misshaped teeth and improving stability[6].

A comprehensive review of literature for enamel reapproximation will discuss five main topics: I.Historical background, II.Applications, III.Techniques, IV.enamel thickness available for reduction and V.Possible iatrogenic effects including caries as well as periodontal risk factors.

I- Historical background of Enamel Reapproximation

Enamel reapproximation was first mentioned by **Ballard**[5] in **1944**. He carried out a study to investigate "Asymmetry in tooth size" between teeth of opposite sides in the same dental arch. He took a sample of 500 models, where he measured the mesiodistal width of each permanent tooth. This measurement was compared with that of the same tooth in the other side. He found that 90 % of the cases showed left-right discrepancy of 0.25 mm or more. He recommended careful reapproximation of the interproximal surfaces, mainly from the anterior segment, when there was a lack of balance.