CURRENT STATUS OF INTERPROXIMAL ENAMEL REDUCTION IN ORTHODONTIC TREATMENT

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ABSTRACT

Proximal striping is a valuable tool for gaining space. The aim of this study was to collect evidence related to proximal striping by conducting a survey. Two hundred orthodontists filled the specially designed questionnaire. 95% of respondents did proximal striping in their patients. 83% respondents felt that teeth become more susceptible to caries but only 13.5% of them had actually seen cases where caries had developed because of proximal striping. When asked whether they were aware of the terminology Air rotar stripping, 67.5% said yes. 80.5% were of the opinion that shape of the teeth were deformed after proximal striping. 55% respondents did proximal striping to treat relapse cases and 67% of them felt that proximal striping prevents relapse in lower anterior crowding. 55.5% of respondents felt that sensitivity develops after proximal striping however, 54% reported to have actually seen where patients developed sensitivity after interproximal striping. Out of the total 86.5% respondents felt that fluoride application should be done to make the teeth more resistant to caries. Proximal striping is a valuable tool for gaining space, treating relapse cases and the technique has become popular after the use of air rotar and clear aligners to treat malocclusion.

Key words: Proximal striping, interproximal enamel reduction, reproximation, slenderization

INTRODUCTION

Interproximal reduction is a method of reducing tooth material and has become popular over the past few years. The introduction to bonding technique exposed the interproximal surfaces and made it available for stripping. Modifying the enamel with interproximal reduction is a valuable tool in gaining space when space requirement is not much. Prior to the advent of interproximal reduction the interarch space was created by extraction, expansion proclination of the teeth or surgery.1

Black was amongst the pioneers who described natural slenderization in 1902. Ballard first described a technique to reduce the tooth material by reducing the enamel.2 Air rotar striping was first described by Sheridan as a clinical technique to reduce and modify the enamel surface. Air rotar striping involves the use of a fine air-rotar diamond cutting bur attached to the handpiece to reduce interproximal enamel.3-4 Peck described reproximation which is another name for enamel stripping as an essential orthodontic treatment.5

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Beggs studied both living and deceased Australian Aborigines and used them as a model for stone age man. He showed that incidence of malocclusion was low in the dentition of the aboriginals. He reasoned that constant wearing of the tooth material due to rough diet was the main reason for the absence of the malocclusion. The aim of this study was to collect evidence related to different aspects of proximal stripping by conducting a survey.

**METHODOLOGY**

A survey was conducted having questions related to different aspects of proximal stripping which is a valuable tool for gaining space. Orthodontist having a clinical practice or serving in a teaching institution were requested to fill the survey forms. Total of three hundred forms were distributed out of which two hundred forms were returned. Total of ten questions were included out of which two dependent questions were there. Most of the respondents were interviewed directly and remaining either returned the forms through post or email (Table 1).

**RESULTS**

95% respondents did proximal stripping in their patients. 83% respondents felt that teeth become more susceptible to caries but only 13.5% of them had actually seen cases where caries had developed because of proximal stripping. When asked whether they were aware of the terminology ARS (Air rotar stripings) 67.5% said yes. 80.5% were of the opinion that shape of the teeth were deformed after proximal stripping. 55% respondents did proximal stripping to treat relapse cases and 67% of them felt that proximal stripping prevents relapse in lower anterior crowding. 55.5% of respondents felt that sensitivity develops after proximal stripping however, 54% reported to have actually seen where patients developed sensitivity after interproximal stripping. Out of the total 86.5% respondents felt that fluoride application should be done to make the teeth more resistant to caries (graph 1).

**Stastical analysis**

182 respondents expected that patients will develop caries after proximal stripping whereas 27 respondents actually observed patients who had developed caries after enamel slenderization. Chi squared value was 1466.728 with 1 degree of freedom. The two-tailed P value was less than 0.0001. This difference was considered to be extremely statistically significant.

111 respondents expected that their patients will develop sensitivity post stripping of enamel and 108 observed patients who had developed sensitivity after proximal striping. Chi squared value was found to be 0.182 with 1 degree of freedom. The two-tailed P value was 0.6695. By conventional criteria, this difference was considered to be not statistically significant.

**DISCUSSION**

Various techniques are available for judicial removal of interproximal enamel. The most popular and conservative means to slenderize enamel is by abrasive strips. The disadvantage of using hand pulled abrasive strips is that it is too laborious and time consuming.

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<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
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<tbody>
<tr>
<td>Do you do proximal stripping to gain space?</td>
<td>190</td>
<td>10</td>
</tr>
<tr>
<td>Do you feel that teeth become more susceptible to caries?</td>
<td>182</td>
<td>18</td>
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<tr>
<td>Do you know about ARS?</td>
<td>135</td>
<td>65</td>
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<tr>
<td>Have you seen cases where caries has developed because of proximal striping?</td>
<td>27</td>
<td>173</td>
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<tr>
<td>Do you feel that shape of the teeth is deformed after proximal striping?</td>
<td>161</td>
<td>39</td>
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<td>Do you feel that proximal striping is a valuable tool for treating relapse case?</td>
<td>110</td>
<td>90</td>
</tr>
<tr>
<td>Do you feel that proximal striping prevents relapse in lower anterior crowding cases?</td>
<td>134</td>
<td>66</td>
</tr>
<tr>
<td>Do you feel that post striping sensitivity is a major problem?</td>
<td>111</td>
<td>89</td>
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<tr>
<td>Have you seen cases where patient developed sensitivity after proximal striping?</td>
<td>108</td>
<td>92</td>
</tr>
<tr>
<td>Do you feel that post striping Fluoride application makes the tooth less susceptible to caries?</td>
<td>173</td>
<td>27</td>
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Hand piece mounted reducing discs can be dangerous because of its close proximity with tongue and other soft tissue like lips and cheek. To avoid lacerating the soft tissue rotating disk guards can be used but guards obstruct the vision of reduction site. The most safest and the most efficient method of interproximal reduction for gaining space within the arch is by air-rotar.7

Air rotar stripping is a contemporary clinical procedure that involves the use of air turbine hand piece to reduce interproximal enamel for alleviation of mild to moderate crowding.4 There is ample evidence that air rotar striping does not induce pathology of the hand or soft tissue.8,9

The space generated by air-rotar striping does not have to be estimated. It can be measured with commercially available gauges. A conservative guideline is to remove no more than .75mm of interproximal enamel between the anterior contact points and no more than 1mm from the posterior contact points.

The intensive orthostrip system (GAC) is an alternative method of reducing interproximal enamel with a hand piece but without a rotating bur. It involves the use of hand piece driven abrasive strips with different configuration and abrasive potential the instrument removes enamel by back and forth shuttle action.

Flexible blades (proxy shape) are also used to contour and smooth the reduced proximal surface with abrasive grain size of different dimensions.10 Interproximal reduction can be used to correct Boltan discrepancy.11 All the interproximal reduction methods make the enamel surface rough and more prone to plaque retention.12 According to a study loss of tooth substance is significantly less for teeth treated by orthostrip. Profilometric analysis of enamel roughness showed that the use of orthostrips in grinding motion produced less rough surface when compared to enamel roughness after Air-rotar stripping.13

On examination of enamel surface by electron microscope showed that furrows are left on the enamel both by diamond burs and diamond disks and it is difficult to eliminate them with normal polishing and cleaning methods.14 The teeth that were subjected to mechanical and chemical abrasive treatments showed a flattened, etched surface free of furrows. These etched surfaces showed marked crystal growth at 5 and 10 hours after remineralization suggesting the possibility of repair of the chemically altered enamel surface.15

In this study most of the respondents were of the opinion that enamel surface becomes rough after proximal striping and the chance of developing caries is increased many fold. Although most of them agreed that enamel surface becomes more plaque retentive and more prone to demineralization but very few respondents actually reported cases where caries developed because of proximal striping. The cause and effect relationship of caries developing after proximal striping is not established as the difference between the expected and observed frequency was statistically significant.

Air rotar stripping also increases the chance of demineralization and fluoride application on freshly cut surface reduces the risk of development of incipient lesions. In this study most orthodontists were of the opinion that fluoride application after interproximal striping should be done to make the tooth surface more resistant to caries attack. The reason that the number of reported cases of caries developing after proximal striping was so less could be because of fluoride application.16,17

Proximal striping by air rotar has become popular in the recent past especially after the advent of invisalign treatment.18 67% respondents used air rotar for proximal striping as it is a faster method to reduce enamel. Although Air rotar striping is becoming popular it also has a risk of cutting more than required enamel and deforming the shape of the teeth. 80% respondents felt that proximal striping deforms the shape of the teeth. This can be prevented by carefully selecting the site for reduction and by proper separation of teeth prior to striping.

Another side effect associated with interproximal reduction is development of sensitivity. 55.5% respondents felt that sensitivity developed after interproximal reduction while 54% respondents actually had seen patients where sensitivity had developed after interproximal reduction. The probable cause of development of sensitivity seems to be the reduced insulating effect after thinning the enamel.

Interproximal reduction can be useful in preventing relapse in lower anterior because point contacts are reduced to surface contacts and prevents sliding of the teeth. 67% of the respondents felt that interproximal reduction is an important tool to treat relapse cases and that it broadens contacts and prevents crowding to reappear in the lower anteriors.
CONCLUSION

Interproximal striping is an important method of gaining space in nonextraction treatment. In future more orthodontists may utilize this technique if this procedure becomes more refined and standardized.

REFERENCES