Proximal Stripping and the Apprehension to Implement it in Contemporary Orthodontics: A Review

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Interproximal reduction, referring to the reduction of tooth structure in the proximal surfaces of anteriors or posteriors as required by the clinical scenario, has most often intrigued the orthodontist and the general dentist in particular in implementing it in contemporary orthodontics on a regular basis. The reduction of tooth structure as likelihood for the development of dental caries proximally, when the patient is undergoing orthodontic therapy, can in itself be a subject of debate between the conservative general dentists and the orthodontist. With recent treatment options for minimal space requirements in aligning teeth and others such as clear aligner therapy which involve the use of proximal stripping, this review aims to present the current concepts in interproximal reduction and its questionable role as an etiological factor in the development of caries.

Keywords: Contemporary orthodontics, Interproximal stripping, Proximal caries

INTRODUCTION

Proximal stripping is also known as interproximal enamel reduction, interdental stripping, enamel approximation, or slenderizing.¹² Ballard was one of the first persons to have used proximal stripping to reduce tooth material excess.³

Over the decades, comprehensive orthodontic treatment has emphasized the importance of achieving ideal occlusion, functional efficiency, and an esthetically pleasing profile. In conventional orthodontic treatment, methods of gaining space for the correction of malocclusion include expansion of the arch, extraction of teeth as required, distalization of molars, uprighting of molars, derotation of posteriors, and proximal stripping. The choice of treatment depends on the amount of crowding, soft tissue profile, and patient’s age. Begg’s philosophy has shown that Australian aborigines did not have crowding which was attributed to proximal wear of teeth surfaces.

This has generated interest in clinicians to use proximal stripping in contemporary orthodontics.⁴ The paradigm shift in treatment modalities in the present era, such as importance for soft tissue profile and the demand for esthetic appliances such as clear aligner therapy, has put forth proximal stripping as a viable treatment modality. Interproximal enamel reduction is not carried out as a sole dental treatment but is most often combined with orthodontic fixed appliance therapy.⁵ Several renowned clinicians such as Hudson,⁶ Paskow,⁷ Peck and Peck,² Sheridan,⁸,⁹ and Zachrisson¹⁰ have used proximal stripping to achieve ideal treatment results.

Indications

Comprehensive orthodontic treatment involves the use of proximal stripping as an adjunct procedure to obtain ideal occlusion. The reduction in the tooth structure mesiodistally is done so as to achieve esthetic alignment of the teeth, establishment of ideal Bolton’s ratio, offer stability for alignment of teeth in the long term, malocclusions which require minimal space for correction (3-4 mm), for spontaneous correction of crowding in mixed dentition and for the correction of black triangles which develop after orthodontic treatment.⁵,¹¹⁻²¹ In the current scenario, proximal stripping serves as a useful adjunct treatment modality for both general practitioners as well as orthodontists when non-extraction treatment is desired.
**Procedure**

The space required for treatment and the site for proximal stripping should be determined using Bolton's discrepancy index. In proximal stripping, up to 50% of interproximal enamel can be removed. The appropriate amount should be 0.5 mm for each tooth in the anterior region, whereas up to 0.75 mm of the proximal surface can be removed for posterior teeth. Before performing proximal stripping, the leveling and aligning phase of orthodontic treatment should have been completed. Rotation of teeth or vertical discrepancies should be corrected so as to check if proper occlusion can be achieved with proximal stripping. A thin brass or steel wire or a wedge should be placed interproximally to protect the interdental papillae. Careful consideration should be given to the thickness of enamel while performing proximal stripping as it varies between different teeth and no relationship exists between size and shape of the tooth and the enamel thickness. The armamentarium that is used for proximal stripping is diamond-coated disks, fine tungsten-carbide or diamond burs or handheld/motor-driven abrasive metal strips (Figure 1). The discs or strips should be placed below the contact points and then drawn up to the occlusal surface. If the stripping armamentarium is motor driven as in Sheridan's air-rotor slenderizing technique, adequate water cooling should be ensured. Burs with safety-tipped non-cutting areas should be used to prevent furrows of the proximal walls, which can occur when using conventional burs. The amount of enamel removed can be measured using gauges made from round orthodontic wire or metal strips with thickness from 0.012” to 0.040” or a digital caliper. After the proximal stripping procedure is completed and the amount of tooth structure removed matches that of the space requirement for correction of malocclusion, contouring of the teeth back to its normal morphology is essential. The contact point should be restored, and the surface should be made smooth using polishing paste and Sof-lex: 3M ESPE (Figure 2). Few authors have suggested the use of phosphoric acid (chemical stripping) for attaining better surface recontouring.

Once surface recontouring is done, surface treatment with fluorides can be done to the stripped proximal surfaces if necessary. This includes application of 85% stannous fluoride for 4 min, fluoride mouth rinses for 45 days, the use of 0.05% sodium fluoride mouthwash once daily or use of 1.23% professionally applied acelidated phosphate fluoride gel for 4 min, casein phosphopeptide-amorphous calcium phosphate tooth mousse.

**CONTRA INDICATIONS AND COMPLICATIONS**

The clinical conditions and malocclusions wherein proximal stripping are contraindicated are poor oral hygiene, crowding of teeth more than 8 mm per arch, enamel hypoplasia, hypersensitivity, multiple restorations, rectangular shaped anteriors, round premolars, and young patients with large pulp chambers. Complications due to proximal stripping arise due to incorrect technique and inappropriate treatment plan. When it is used as an alternative to extraction treatment in borderline cases, it is important for the clinician to understand that overzealous stripping may cause hypersensitivity, irreversible pulp damage, increased incidence of caries, and periodontal disease. Ever since the introduction of proximal stripping as an adjunct treatment in fixed orthodontic therapy, there have been many contradictory reports on the role of proximal stripping as an iatrogenic etiology for the development of caries. In many countries, wherein general dentists practice
orthodontics, there has been apprehension to perform proximal stripping as a routine procedure. This has led to various studies being done to produce a definite answer to the question “does proximal stripping cause increased susceptibility to caries?” It is a common perception that tooth surface irregularities can promote plaque accumulation and cause irreversible damage such as caries and periodontal breakdown. There are few controlled studies done with short follow-up periods, which have tried to find the relationship between proximal stripping and susceptibility to caries and periodontal breakdown. These studies have shown there is no difference between unaltered and stripped enamel surfaces. Zachrisson developed a technique for proximal stripping using a perforated diamond-coated disk (<30 µ grain size) with adequate air and water cooling followed by polishing with fine and ultrafine Sof-lex (3M ESPE) disks. Scanning electron microscope studies by Zhong et al. and long-term studies by Zachrisson et al. which evaluated this technique confirmed that proximal stripping when done with Zachrisson’s technique, does not predispose the enamel surface to caries.

There does exist a difference in the views of general dentists as compared to orthodontists regarding the proximal stripping procedure. In the current scenario, general dentists are increasingly performing proximal stripping in orthodontic therapy using clear aligners. Recent studies have shown that general dentists are more conservative in their approach and tend to use ideal polishing procedures and topical fluoride application as compared to orthodontists. General dentists are not comfortable with using proximal stripping as a routine procedure. Orthodontists have extensively researched on proximal stripping and its effects over the years. It has been shown that fluoride application on stripped tooth surface has minimal benefits in preventing caries in patients exposed to sources of fluoride such as tooth and fluoridated water. This can be one of the reasons as to why orthodontists are less likely to apply topical fluoride for the stripped surfaces. Enamel roughness due to proximal stripping is one of the factors which has been evaluated extensively in various in vitro and in vivo studies. A recent systematic review evaluated the evidence in relation to enamel roughness and caries susceptibility of patients treated with interproximal stripping. It was concluded that the incidence of caries on tooth surfaces treated with proximal stripping was statistically equivalent to that of intact surfaces.

CONCLUSION

The current era in orthodontics is evidence based. Any apprehension in treatment modality can be laid off with sufficient evidence from clinical studies and systematic reviews. With treatment modalities such as clear aligner therapy which demand the use of proximal stripping, the need to ascertain the fact that proximal stripping does not increase the susceptibility to caries is important. This review shows that current scientific literature does not support the role of proximal stripping in causing dental caries, but further studies are needed to establish a standard protocol for proximal stripping procedure.

REFERENCES

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