

# Interproximal Enamel Reduction for gaining space in Orthodontics- Diagnosis, Technique & Sequelae.

Dr Ram Gopal<sup>1</sup>, Dr Tulika Tripathi<sup>2</sup>, Dr Priyank Rai<sup>3</sup>

Senior Resident<sup>1</sup>, Dept. of Orthodontics<sup>2</sup>, Sr. Professor & HOD<sup>2</sup>, Professor<sup>3</sup>, Dept. of Orthodontics<sup>1,2,3</sup>, Maulana Azad Institute of Dental Sciences New Delhi<sup>1,2,3</sup>

## Access Online



### Introduction

Interproximal enamel reduction (IER) is the clinical procedure which involves removal of a calculated amount of the enamel from the interproximal contact area. The aim of this reduction is to create space for orthodontic treatment and to give teeth a suitable shape whenever problems of shape or size require attention. In the literature<sup>1</sup>, this clinical act is normally referred to as “stripping,” although other names can be found, such as “slendering,” “slicing,” “hollywood trim,” “selective grinding,” “mesiodistal reduction,” “reapproximation,” “interproximal wear,” and “coronoplastia.” IER is a critical procedure which needs meticulous planning<sup>2,3</sup> to resolve tooth material arch length discrepancy. Therefore, planning and execution need to be carefully assessed.

### Indications

1. Tooth size discrepancy.
2. Crowding of mandibular incisors. Stripping is used to obtain space for the correction and prevention of crowding.
3. Tooth shape and dental esthetics. Stripping can and should be used for the reshaping of enamel on some teeth, thus contributing to an improved finishing of orthodontic treatment and dental esthetics.
4. Moderate dental crowding cases with pleasing profile. This is a primary area of application for IER in the technique developed by Sheridan<sup>4,5</sup>, which allowed space to be obtained for the correction of moderate dental crowding; upto 8 mm per arch could be achieved without the need for extraction or excessive expansion.
5. Normalization of gingival contour and elimination of triangular spaces above the papilla, thus greatly improving esthetics and smile.

6. When expansion of arches can't be done, pleasing profile with mild to moderate crowding.
7. Camouflage of Class II and III malocclusions. The use of mandibular stripping can be beneficial in camouflaging slight to moderate Class III conditions and overjet. In orthodontic treatment to camouflage Class II with the extraction of two maxillary premolars, correcting the crowding and inclination of the mandibular incisors with stripping is an ideal solution.
8. Correction of the curve of Spee. For the correction of an exaggerated curve of Spee, it is necessary to create a few millimetres of space in the arch. This can be achieved through moderate stripping.

### How much interproximal enamel can be safely removed?

It has been suggested that approximately 50% of the interproximal enamel can be safely removed<sup>6</sup>. Estimates of the amount of tooth structure that can be removed depend on enamel thickness.

Enamel on the second molars is significantly thicker (by 0.3 to 0.4 mm) than enamel on the premolars. In addition, distal enamel was significantly thicker than mesial enamel. Assuming that 50% enamel reduction leaves adequate protection for the tooth, applying this procedure to the premolars and the molars should yield 9.8 mm of additional space for realignment of mandibular teeth<sup>7</sup>.

Sheridan<sup>5</sup> in his study describing air rotor stripping as a means for IER stated that if one half of enamel from each of the eight buccal contacts from an arch is removed approx 0.8mm / contact, 6.4mm of space is created. Removing one half of interproximal enamel from the anterior teeth 0.5mm/contact creates an additional space of 2.5mm. Therefore a cumulative gain of 8.9mm within an arch is possible, giving a chance to avoid undesirable extraction and expansion procedures.

Following the latest update<sup>6</sup>, 1 mm (.5 mm per proximal surface) can be removed from the contact points of the buccal section, while stripping of the lower incisors should not exceed .75 mm at each contact point due to the thinner proximal walls. Nonetheless, the orthodontist should not underestimate the variations in proximal enamel thickness among tooth

categories and customize the enamel surface preparation according to individual's characteristics. It is also useful to relate the amount of enamel that can be removed to the actual shapes of teeth, restorations and crowns. The amount of gained space can be substantial in teeth with deviating morphology, and especially triangular-shaped teeth.

Thickness of the interproximal enamel can be estimated by projecting a line cervically vertical to the occlusal or incisal plane. Dentin is projected in a straight line or a line that tapers down towards the pulp in a radiograph.

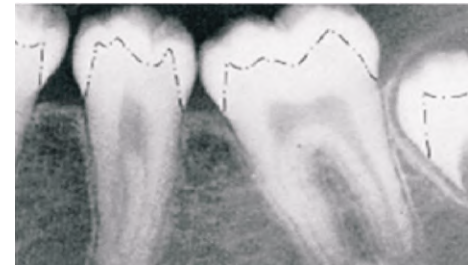


Fig. 1 Dentin tapering from the cervical line towards the pulp chamber.

### Anomalies In Tooth Morphology

Many patients presenting for orthodontic treatment have a Bolton tooth-size discrepancy that may influence treatment goals and results. Identifying such discrepancies before final tooth alignment should prove beneficial in defining the final expectations of both the clinician and the patient. Enamel reduction also suffices for correction of a Bolton tooth-size discrepancy. The Bolton tooth-size analysis comprises the anterior ratio (mean 77.2 ± 1.65%; range 74.5–80.4%) and the posterior ratio (mean 91.3 ± 1.9%; range 87.5–94.8%) of tooth-size differences between the mandibular and maxillary mesiodistal teeth. In certain circumstances the ratio may even indicate the feasibility of extracting one lower incisor. It has been shown that naturally well-aligned mandibular incisors have distinctive dimensional characteristics. Such teeth have significantly smaller mesiodistal (MD) dimension and significantly larger faciolingual (FL) dimension than mandibular incisors in the average population. It appears, therefore, that tooth shape (MD and FL dimensions) may be a factor in determining whether crowding of the lower incisors will occur.

Peck and Peck<sup>2</sup> used this information to develop their index for use in clinical orthodontics. The index uses an MD/FL ratio, which determines whether a lower incisor is favourably or unfavourably shaped to achieve good lower anterior alignment. The following ranges are employed as clinical guidelines for the maximum desirable MD/FL index values for the lower incisors: 88% to 92% for the mandibular central incisor and 90% to 95% for the mandibular lateral incisor. Enamel reduction assists in adjusting values to within these ranges.

**Procedure**

**Interproximal enamel reduction steps:**

- 1. Comprehensive planning:** Study cast measurements can determine the required amount of correction. Ideally, a diagnostic set-up will supplement treatment planning and visualize the final position and morphology of teeth.
- 2. Access to the interproximal areas:** As a general rule, placement of fixed appliances and correction of rotations are recommended prior stripping. An initial phase of levelling and aligning will establish proper contact points. Visibility and mechanical access to the proximal surfaces will be further improved by means of a coil-spring, separator or wooden wedge.
- 3. Protection of the soft tissues:** According to ARS guidelines, an .020-.030" brass or steel indicator wire should be placed gingival to the contact point to protect interdental tissue. The interference of a metal separator or a wedge will also minimize the risk for interproximal gingival lesions.

between tissue and bur, prevents nicking papilla and keeps lip and tongue away during ARS.

- 1. Interproximal enamel removal:** Mesiodistal enamel reduction is performed by either manually by abrasive strips or mechanical methods.

**Mechanical methods**

Stripping is done by metallic strips, very fine diamond drill and discs which are single or double sided<sup>7,8</sup>. Sheridan advised the use of carbide fissure drills for turbines, cutting from a horizontal position and parallel to a 0.022-inch wire, called an "indicator wire," which was previously positioned at the gingival margin. For the shaping and finishing of the tooth, a finegrain diamond drill is recommended. IER is quantified by the means of commercially available thickness/leaf gauges.

**The Air Rotor Stripping (ARS) technique**

- 1. Remove only a measured 1mm (.5mm perproximal surface) of enamel from any buccal interproximal area.** The obvious reason for performing interproximal reduction in the buccal segments is that they contain substantially more proximal enamel than is found in the anterior region. The 1mm limit is conservative: it represents about one-third, not one-half, of the enamel bulk in a buccal contact. Because the proximal enamel is thinner on the upper lateral incisors and lower incisors, only a measured .5mm should be removed from any of these anterior contact points.
- 2. Establish an open field with a coil spring or separator prior to ARS.** This significantly improves both visual and mechanical access to the contact area. The separation space can be measured with a space gauge and added to the projected 1mm enamel reduction. Compared to a coil spring, an elastomeric module has the advantage of slightly depressing the peak of the papilla, making it less likely to be cut by the rotating bur in a handpiece.
- 4. Use an indicator wire to protect interdental tissue during ARS.**
- 5. Use Safe-Tipped ARS burs to avoid inadvertent enamel ledging and scarring.** The newer ARS burs have safety-tipped noncutting areas to prevent the scarring of proximal walls that can occur when using conventional burs with squared-off tips.
- 6. Finish proximal surfaces to an acceptable morphology and texture.** After the initial enamel reduction of 1mm is achieved, usually with a tapered fissure carbide bur, use a

medium- or fine-grit diamond bur to contour the proximal surfaces to a normal morphology and texture.

- 7. Prescribe a fluoride gel or rinse to supplement the remineralisation potential of the abraded proximal surfaces to avoid dental caries.**

**Conclusions**

- IER is a part of orthodontic treatment for gaining a modest amount of space and adjusting the Bolton Index discrepancy, and is a viable alternative to the extraction of permanent teeth. The main interproximal enamel reduction techniques are abrasive metal strips, diamond-coated disks, and air-rotor stripping.
- Possible complications of interproximal enamel reduction are hypersensitivity, irreversible

Damage to the dental pulp, increased formation of plaque, the risk of caries in the stripped enamel areas and periodontal diseases.

**References:**

- Martinho L. R. Moreno Pinheiro. Interproximal Enamel Reduction. *World J Orthod* 2002;3:223-232.
- Peck H, Peck S. An index for assessing tooth shape deviations as applied to the mandibular incisors. *Am J Orthod*.1972;61:384-401.
- Tuverson DL. Anterior interocclusal relations: Part I. *Am J Orthod*.1980;78:361-370.
- Sheridan JJ. Air-rotor stripping. *J Clin Orthod*.1985;19:43-59.
- Sheridan JJ. Air-rotor stripping update. *J Clin Orthod*.1987;21:781-787.
- Chudasama D, Sheridan JJ. Guidelines for Contemporary Air-Rotor Stripping. *J Clin Orthod*.2007;41(6):315-20.
- Livas C, Cornelis Jongsma A and Yijin R. Enamel Reduction Techniques in Orthodontics: A Literature Review. *Open Dent J*. 2013;7:146-151
- Rossouw PE, Tortorella A. Enamel Reduction Procedures in Orthodontic Treatment. *J Can Dent Assoc*.2003;69(6):378-83



Fig. 2. An .020" wire, placed beneath archwire and

**9<sup>th</sup> Anniversary**  
**54<sup>th</sup> ISSUE**  
**A Big Success**

