

OVERVIEW

Guidelines for Contemporary Air-Rotor Stripping

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(Editor's Note: In this quarterly column, JCO provides a brief overview of a clinical topic of interest to orthodontists. Contributions and suggestions for future subjects are welcome.)

Air-rotor stripping (ARS) was first described more than 20 years ago in this journal as an alternative to extraction or expansion in borderline cases.¹ Since then, further studies have indicated that hard and soft dental tissues can respond to the physiological trigger of interproximal reduction by nonpathological adaptation, and that an ARS site may be more resistant to carious and periodontal disease than unaltered enamel surfaces are.²⁻¹¹ ARS can be used in adolescents as well as adults, since the interproximal enamel thickness is basically the same in both groups.

Unlike previous methods of interproximal reduction, ARS generates space primarily, although not exclusively, in the buccal segments. The amount of ARS can be directly correlated to the amount of

crowding to be resolved. If 6mm of arch length is needed, 6mm of space can be created. Using the guideline of 1mm of interproximal reduction at each contact point, as much as 8mm of space can be generated in the buccal segments of one dental arch (Fig. 1).

Another unique feature of ARS is that it is performed with a high-speed turbine handpiece, rather than hand-pulled abrasive strips or hand-piece-mounted disks. An abrasive strip is awk-



Fig. 1 A. Removing 1mm of interproximal enamel from each buccal contact point can create enough space to alleviate moderate crowding. **B.** After consolidation of ARS sites, 4mm of space has been gained.



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ward and laborious to use in the buccal segments, while the proximity of the tongue and cheeks makes a rotating disk potentially dangerous. Interproximal reduction with an air-turbine handpiece, on the other hand, is precise, painless, and efficient.

Extraction and expansion are particularly difficult to incorporate in planning treatment for the increasing number of adult patients who choose clear plastic appliances such as Essix,* Invisalign,** and Ideal Smile.*** ARS is frequently utilized as an alternative for the alleviation of mild-to-moderate crowding in conjunction with these appliances.

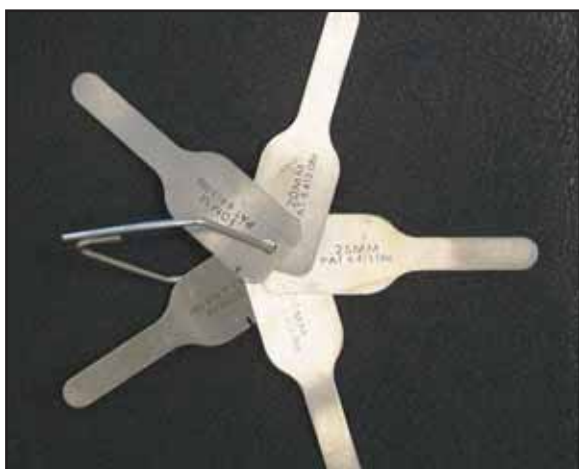


Fig. 2 Commercially available gauges precisely measure amount of interproximal reduction.

The following contemporary guidelines are suggested to help the clinician realize the full potential of ARS.

1. Remove only a measured 1mm (.5mm per proximal 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.^{12,13} Although most authors have stated that one-half of the proximal enamel bulk can be safely reduced without adverse consequences, we have been uncomfortable with this anecdotal estimate because it has no scientific basis, and because the critical detail of

*Raintree Essix Corporation, 4001 Division St., Metairie, LA 70002; www.essix.com. Essix is a registered trademark.

**Registered trademark of Align Technology, Inc., 851 Martin Ave., Santa Clara, CA 95050; www.aligntech.com.

***GAC International, Inc., 355 Knickerbocker Ave., Bohemia, NY 11716; www.gacintl.com.



Fig. 3 Establishing open field with separator or coil spring provides better visual access for ARS and for establishing proper morphology of reduced proximal surfaces.

how to measure the amount of reduction has not been defined.

In contemporary ARS, the reduction of a buccal interproximal site can be measured, using commercially available gauges,* to within one-tenth of a millimeter (Fig. 2). The 1mm limit is conservative: it represents about one-third, not one-half, of the enamel bulk in a buccal contact.^{12,13}

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. When incisors are reduced, a normal proximal enamel morphology should be established, rather than flattening these areas to achieve a keystone effect for retention. We are not aware of any data that substantiate the retentive benefit of squared-off proximal surfaces.

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 (Fig. 3). 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.



Fig. 4 If rotations are corrected prior to ARS, contact point will be more physiologic when space is eventually closed.

3. If possible, correct rotations prior to ARS.

Interproximal reduction of a contact point between rotated teeth will often be compromised (Fig. 4). Leveling and aligning the teeth prior to ARS will place the contact point in a better position after reduction. Although it may require a bit of “round-tripping” to align the proximal surfaces before ARS, when the ARS site is ultimately closed, the interproximal morphology will be more acceptable.

4. Use an indicator wire to protect interdental tissue during ARS.

Prior to ARS, an .020-.030" brass or steel indicator wire should be placed gingival to the contact point (Fig. 5). With the wire interposed between the rotating bur and the tissue, the interdental area is

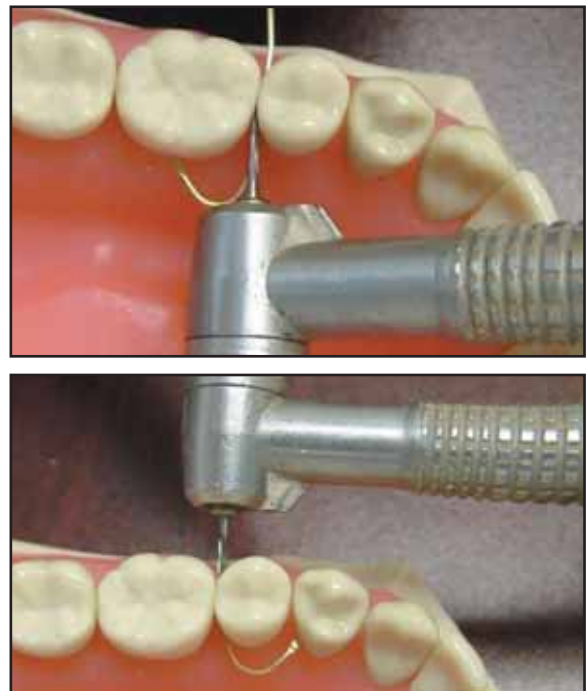


Fig. 5 Inserting indicator wire beneath contact point prior to ARS protects interdental papilla from laceration with rotating bur. Placing bur beneath contact point, gently wiping in occlusal direction, and alternating from buccal to lingual helps establish proper interproximal morphology and parallel enamel walls.

protected against laceration. This is especially important in younger patients whose tissue completely fills the interproximal sites.

The ARS site is created by placing the bur beneath the contact point, and the interdental enamel is reduced with light, occlusally directed wiping strokes. The bur should be moved alternately from buccal to lingual until the desired amount of space has been created (Fig. 5). Its tapered shape will help establish an acceptable morphology, making it easier to create parallel proximal surfaces.

5. Use Safe-Tipped ARS burs (STARS*) to avoid inadvertent enamel ledging and scarring.

The newer ARS burs have safety-tipped non-cutting areas to prevent the scarring of proximal walls that can occur when using conventional burs with squared-off tips (Fig. 6).

6. Use Intensiv Ortho Strips as an alternative to a rotating bur in a handpiece.

The Intensiv Ortho Strip System† can efficiently reduce interproximal enamel without a rotating bur. It involves handpiece-driven abrasive strips with .8mm back-and-forth shuttle action. The strips are supplied in various configurations and abrasive grain sizes for reduction, contouring, and smoothing of the proximal enamel surfaces. This

technology takes more time than a rotating bur, but the end result may be more satisfactory. The thinner blades can also remove extremely small amounts of intermolar enamel to provide banding space if separation has not been effective.

7. Finish proximal surfaces to an acceptable morphology and texture.

After the initial enamel reduction of 1mm is achieved, usually with a No. 699L tapered fissure carbide bur,* use a medium- or fine-grit diamond bur to contour the proximal surfaces to a normal morphology and texture. With even finer finishing diamonds and Sof-Lex disks‡ (Fig. 7), the enamel walls can be finished to a smoother texture than unaltered surfaces.^{7,14}

8. Perform final smoothing with a phosphoric acid gel.

Recent electron microscopy data indicate that finishing the reduced ARS site with a 35% phosphoric acid etchant, as commonly used in

*Raintree Essix Corporation, 4001 Division St., Metairie, LA 70002; www.essix.com.

†GAC International, Inc., 355 Knickerbocker Ave., Bohemia, NY 11716; www.gacintl.com.

‡3M ESPE Dental Products, 3M Center, St. Paul, MN 55144; www.3m.com/espe.

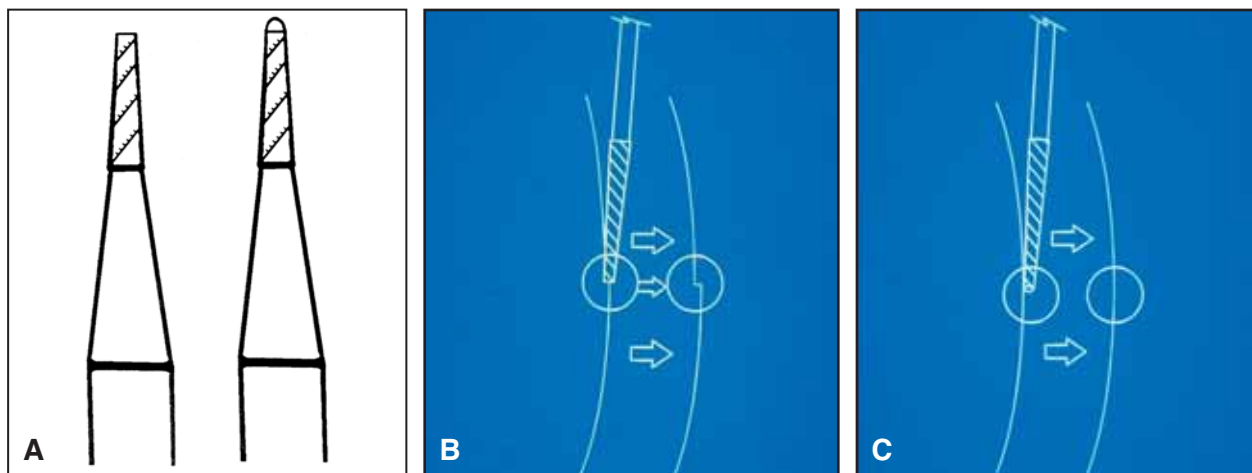


Fig. 6 A. Comparison of conventional bur (left) and Safe-Tipped ARS (STARS) bur. B. Conventional bur may notch proximal enamel well. C. STARS bur prevents scarring of proximal enamel.

bonding, can further smooth a reduced enamel surface, even after fine-grit diamonds and polishing disks.⁶ A fine abrasive strip, coated with a phosphoric acid gel layer, is used to briefly polish the proximal surfaces (Fig. 8). The site should then be thoroughly rinsed with a water spray.

9. Reduce one site at a time.

If possible, avoid doing all the interproximal reduction at one appointment. For better control, it is best to strip sequentially by working from posterior to anterior in the buccal segments and moving the teeth distally like beads on a string. Reduce one site, consolidate the space, and repeat the sequence at subsequent visits until there is enough space to resolve the problem. This controlled sequence will reduce the likelihood of creating excess space.

10. Establish anchorage when consolidating ARS space.

Don't waste the created space. Every ARS case should be treated as a critical anchorage situation, according to the clinician's preference for anchorage preparation—whether it be a lingual arch, a Nance holding arch, headgear, miniscrews, banded second molars, or archwire stops against the molar tubes.

††Johnson and Johnson Corp., One Johnson and Johnson Plaza, New Brunswick, NJ 08933.



Fig. 7 Fine Sof-Lex disk smooths proximal surface to resemble natural enamel.

11. Do not strip preemptively to balance tooth-mass ratios between arches.

Studies have found that the teeth can usually be moved into an acceptable occlusion after ARS, even when the patient has an abnormal Bolton ratio.¹⁵ If a proper occlusion cannot be established, however, it usually becomes apparent after the leveling and alignment phase or during the finishing phase, when compensatory stripping in an opposing arch may be required to ensure occlusal and incisal efficiency.

12. Prescribe a fluoride gel or rinse to supplement the remineralization potential of the abraded proximal surfaces.

Studies show that when the fully reacted outer layer of enamel is removed, the stripped enamel surface is more prone to remineralization. When that occurs, the new enamel surface will be more resistant to demineralization, which is the precursor of caries.^{10,11} Therefore, it is prudent to have the patient use a commercially available fluoride rinse such as ACT^{††} to maximize the remineralization potential after ARS.¹⁶

13. Do not use ARS as a stand-alone technique.

ARS can be used to limit the required amount of expansion, and it can also be coupled with extractions when the removal of teeth alone will not be adequate to resolve crowding. ARS can be of considerable benefit in finishing a case when a



Fig. 8 Final smoothing with fine abrasive strip coated with phosphoric acid etchant.

Bolton discrepancy is evident and the clinician needs to modify tooth widths to produce the best fit of the occlusion.

Following the contemporary guidelines presented here will allow the orthodontist to use ARS with more confidence and precision.

ACKNOWLEDGMENTS: The authors appreciate the help of Drs. Kapil Vij and Herbert Murillo in the preparation of this article.

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