

INTERPROXIMAL REDUCTION (IPR) TIPS

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PURPOSE

Key to achieving a successful outcome with Invisalign orthodontic treatment is the accurate delivery of interproximal reduction to exactly match the prescribed amount programmed into the Aligners. The amount of reproximation present in the patient's digital file must be accurately

recreated in the patient's mouth for optimal clinical results. Too much reproximation will lead to residual space at the end of treatment, and not enough will lead to residual crowding and possibly even unexpected dental intrusion (figures 1 and 2).

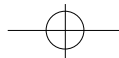
METHODS

For reproximation prior to taking PVS impressions, a number of techniques can be employed. A comprehensive discussion on space creation prior to impression taking is well described in The Updated Air-Rotor Stripping (ARS) Manual by Dr. Jack Sheridan. Reproximation prior to the PVS impression affords the benefit of maximum accuracy of Aligner fit and reduced chair time during Aligner delivery. When planning to strip the teeth prior to the PVS impression, it is often beneficial to determine the amount of removal required by virtue of a lab set-up of the teeth (figure 3). Recreating the lab set-up dimensions using calipers and interproximal measuring gauges as the teeth are recontoured can help ensure maximum accuracy (figure 4). If recontouring teeth prior to the impression, it is also important to hold the position of the teeth with a retainer while waiting for delivery of the Aligners.

Reproximation performed during the course of Aligner delivery requires several components for best results: a guide indicating exactly where, how much, and when to remove the enamel, instruments that effi-

ciently remove incremental amounts of enamel, and a way to measure the amount of enamel removed. The reproximation form generated for each patient's case indicates to total amount (in 1/10th mm increments) that needs to be removed as well as the stages when the reproximation should be done. It is created from Align Technology's proprietary "Treat" software, which calculates the amount to remove based on the final set-up tooth positions (figure 5).

The three most common ways of reproximating after the PVS impression (i.e., during Aligner delivery) are with a high-speed needle-tip diamond, a slow-speed diamond disk, and manual diamond reproximation strips. The high-speed technique uses a needle-point diamond bur and offers the greatest efficiency and directional control (figure 6). When using the high speed technique, it is especially important to avoid creating subgingival interproximal ledges. Otherwise, a food trap might be created and the interproximal space may become impossible to fully close.



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The slow-speed diamond disk technique is also an efficient technique, but the size of the disk requires that adequate interproximal access and minimal crowding be present to avoid stripping surfaces that do not require it. The high torque of the disk also requires that extreme caution be taken to avoid iatrogenic trauma to the patient's surrounding soft tissue. Low RPMs are recommended and soft tissue protection is a must, whether it be in the form of a disk guard (figure 7), tongue depressor, or at the very least, a mouth mirror (figure 8). The main benefit of using the disk is the reduced risk of generating subgingival ledges and the ease at which smooth parallel interproximal walls can be created (figure 9). In the event that a subgingival ledge is created, it is important the disk be extended beyond the point of the ledge to remove the ledge.

This may first require reducing the ledge with manual diamond strips to help allow the disk to fully seat in order for the ledge to be removed.

Manual diamond strips afford the greatest clinician control, but are very labor-intensive. Consequently, diamond strips are only recommended for small increments of enamel removal and for detailing (usually <0.25 mm). Diamond strips can be used to break the contact for the diamond disks as well as for general reproximation and enamel recontouring. The strips allow sharp corners to be rounded out, thereby creating a more natural dental anatomy. Perforated strips impart the benefit of reduced clogging (figure 10). It is always good practice to check crowded interproximal contacts with floss at every patient appointment and lighten any tight contacts with diamond

strips, even if IPR is believed to be completed. This is because even the slightest 1/100th mm of binding can impede a tooth's movement towards the desired goal, and neither the gauges nor the sophisticated software at Align can reveal such minute discrepancies.

Once the initial amount of enamel has been removed, verification of the size of the gap is important so that too much enamel is not removed. Incremental thickness gauges are sized in 0.1 mm intervals and indicate the amount of enamel removed (figure 11). Once the desired amount has been removed, it is important to round the line angles using manual reproximation strips (figure 12). The amount of enamel removed should also be tracked in a central location to easily note the location and total amount of enamel removed from the patient.

SUMMARY

Mastering interproximal reduction (IPR) skills is essentially for success with the Invisalign System. Indications for IPR include non-extraction treatment of moderate to severe crowding, treatment of crowding with minimal buccal periodontal support, correction of tooth-size discrepancy,

camouflage of dark interproximal triangles caused by deficient gingival papilla, and compensation for any minute discrepancies from the Aligner manufacturing process. Doctors should be familiar with the differences between pre- and post-PVS reproximation, the different techniques available

(high-speed, slow-speed, and manual), and at a minimum, check interproximal contacts with floss and diamond strips at each patient appointment, even for non-IPR cases.

Figure 1



Initial model

Figure 2

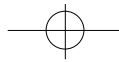


Progress model. IPR was required mesial and distal to the upper second bicuspid to achieve a better Class I relationship. Not enough stripping was done leading to dental intrusion of the bicuspid.

Figure 3



Pre-PVS lab set up to determine where IPR might be required. (Norris)



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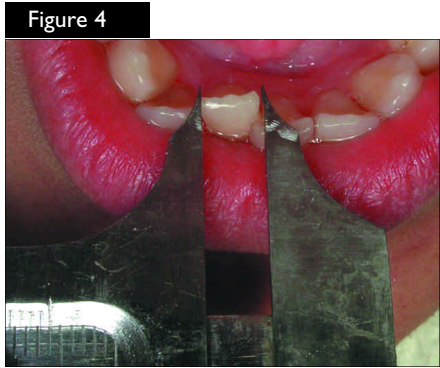


Figure 4
Recreating the dimensions of the lab set-up intraorally prior to taking PVS impression. (Norris)

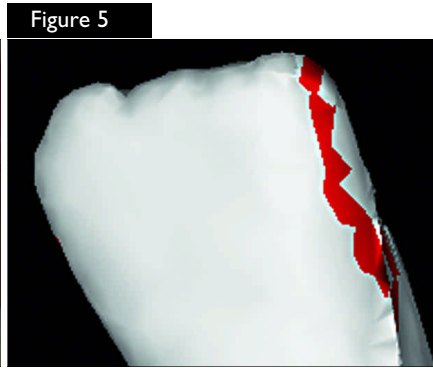


Figure 5
The amount to be removed is highlighted in red, and the width dimension exported and sent as a Reproximation Form to the doctor.

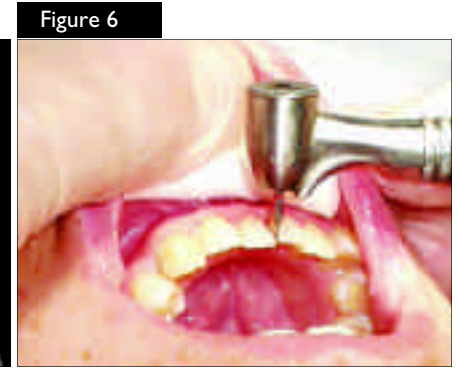


Figure 6
Needle-tipped diamond bur with copious irrigation to effeciently recontour interproximal surfaces. (Wheeler/Dolce)

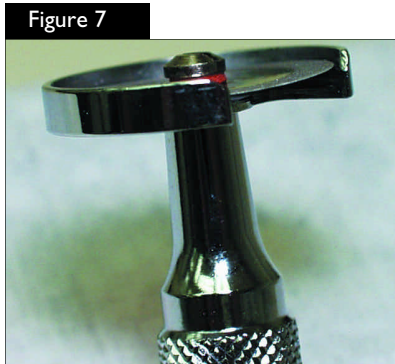


Figure 7
Diamond disk with disk guard to protect the soft tissue. (Wheeler/Dolce)

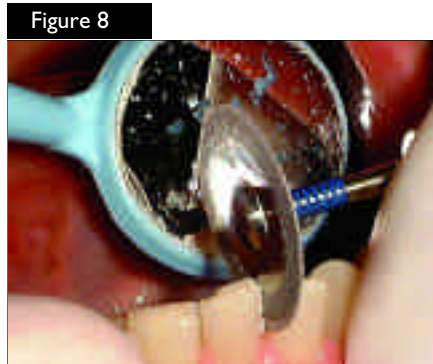


Figure 8
Mouth mirror to protect the tongue. Disk is spinning labially towards the mirror at very low RPMs. (Womack)



Figure 9
Smooth parallel lines without subgingival ledges is the goal. (Womack)

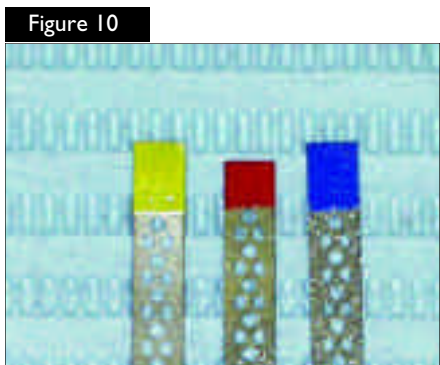


Figure 10
Perforated diamond strips in three thicknesses (Yellow=extra fine, Red=fine, Blue=medium). Extra tight contacts can be effectively opened by first starting with the yellow and working up to the blue. (Wheeler/Dolce)

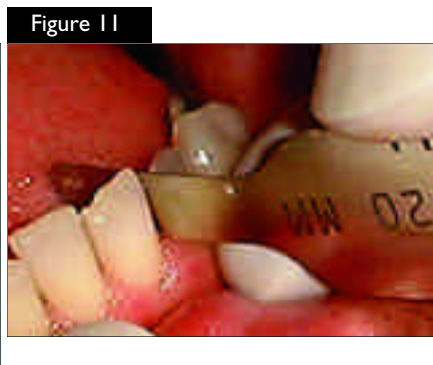
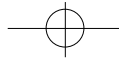


Figure 11
Thickness gauge to verify the amount removed in 1/10th mm increments. (Womack)



Figure 12
Using diamond strips to round out line angles and create natural-looking dental anatomy. (Womack).



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