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RESTORATIVE

A More Efficient and Detailed Impression Technique

INTRODUCTION

Lab-fabricated fixed restorations, in most practices, require an impression of the teeth and the area to be restored. Although some clinicians are now digitally scanning (16% to 18%)[1] and/or providing in-office milled single units for their patients, this still represents a small percentage of the practices providing fixed restorations. The majority of doctors still rely on traditional physical impressions for their lab-fabricated restorations. Additionally, those laboratories that are doing CAD/CAM restorations are, in many cases yet, scanning models created from impressions and then using the physical models to finish the restorations.

Gingival Retraction Systems for Impression Taking

Retraction methods, be they cords, pastes, or other methods, typically require additional steps and materials, increasing treatment time at the appointment and costs to render that treatment.[2] The time required to use cords and pastes to achieve retraction so that the margins of the preparation can be captured may add anywhere from 5 to 15 minutes to the treatment time. When one includes the cost of production time, the average impression costs more than $100, with the doctor's time representing 90% of this cost, and about half of that time is required for the retraction and hemostasis procedures. The time involved when multiple preparations need to be captured increases related to the additional time to place cords or pastes in the additional preparations.

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Those patients with hemorrhagic tissue in the sulcus often add even more time, again increasing the total time required. This is not just limited to patients with periodontal issues, as it can also include those patients who are on blood thinners (including daily aspirin), with all such patients being prone to sulcular oozing with minimal provocation.[3] Additionally, these patients, when the cord is removed, may start bleeding anew, increasing the frustration level for the clinician as the cord must be reapplied to the sulcus in the hope that, the second time the cord is removed, oozing will not begin again. Retraction pastes can also present with challenges in these patients; rinsing the paste off the preparation and out of the sulcus may also initiate sulcular bleeding.

Retraction materials that are injected into the sulcus as a separate step and typically used with vinyl polysiloxane (VPS) impression materials include products such as GingiTrac (Centrix Dental). Like impregnated retraction cords and clay-based pastes, these materials contain 15% alum. Following injection into the sulcus, the patient is instructed to bite on a cotton cap to apply pressure to the sulcular material while the material sets and exerts its chemical effects. The cotton cap and set retraction material is then removed, and the patient is ready for the light-bodied impression material to be placed into the sulcus as the next step in taking the final impression. As with retraction pastes, the use of the VPS retraction material requires a separate step and increases time at the chair; and, in addition, removal of the material may initiate some sulcular oozing in some patients, thus complicating the final

impression process.[4]

The question becomes, how can the clinician simplify the impression process without increasing chair time and material costs while also not sacrificing impression accuracy?

Impression Challenges

A growing percentage of the aging population are on blood thinners prescribed by their physicians for the prevention of strokes and as cardiac health aids. Many more patients take a daily aspirin as a cardiac preventative. As mentioned previously, those patients, even when their periodontal health is good, are subject to sulcular bleeding or oozing that prevents accurate capture of the restorative margins. Some have advocated placement of the supragingival restorative margins when possible, allowing the clinician to easily capture the margin in the final impression, reducing the removal of tooth structure and also improving the ability for the patient to keep the area clean. The decisions involved in the placement of the restorative margin at or below the gingival margin are often determined by aesthetic needs and the presenting condition of the tooth being restored. They are ultimately governed by the knowledge and skill sets of the individual practitioner. Unfortunately, although supragingival margins are an ingredient in more ideal and conservative dentistry, in the real world, clinicians are often faced with less-than-ideal situations regarding their patients. For example, a previously placed restoration that presents and may now need a full-coverage crown may often dictate that the apical placement of the new margin be even deeper than where the prior filling margin was placed. This is also sometimes required in order to achieve an adequate ferrule effect and to preclude a potential avenue for recurrent decay to percolate between the filling (amalgam or composite) and the dentin interface. Furthermore, capture of the impression subgingivally is not just a clinical challenge when using traditional impressions; it is also an issue when utilizing digital impressions. If the subgingival margin is not visible due to tissue from the sulcus wall overlaying it or fluids (blood and saliva) masking it, the digital scanner cannot capture it. Retraction cords and retraction pastes have been recommended and used to aid

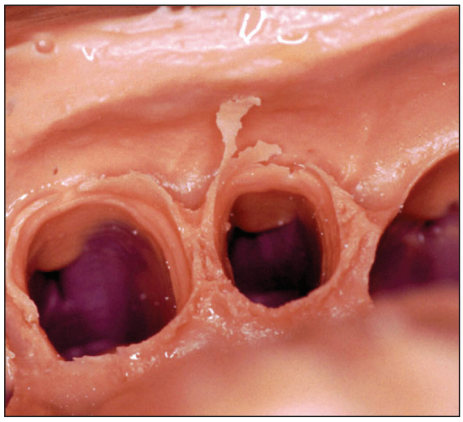

Figure 1. Wash material with poor tear strength will affect the accuracy in capturing the restorative margin in the final impression.

Figure 2. A NoCord (Centrix Dental) impression of molar preparations, demonstrating an accurate and detailed capture of the margin.

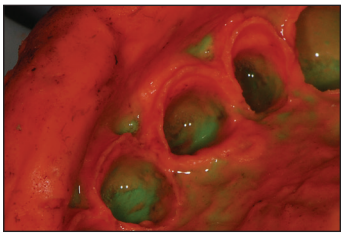

Figure 3. Thin subgingival segments of NoCord Wash Material (Centrix Dental), demonstrating good tear strength.

Figure 4. Cartridge-based MegaBody Tray Material (Centrix Dental) is shown being expressed into the impression tray.

Figure 5. Bulk mixer-based MegaBody Tray Material is shown being expressed into the impression tray.

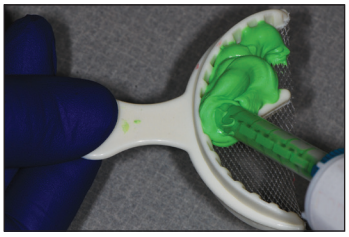

Figure 6. MegaBody Tray Material is expressed into the tray.

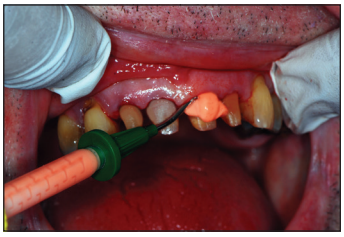

Figure 7. NoCord Wash Material is injected into the sulcus of the prepared teeth, with the intraoral 18-ga metal tip attached to the impression cartridge on the gun.

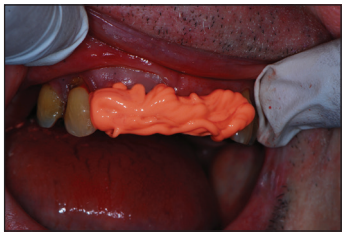

Figure 8. NoCord Wash Material is applied to completely cover the preparations.

Figure 9. The previous tray filled with MegaBody vinyl polysiloxane material was inserted over the applied NoCord Wash Material, and then the patient occluded into the material-filled tray, driving the wash into the sulcus.

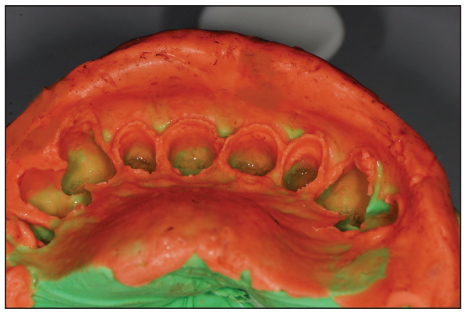

Figure 10. Subgingival marginal detail, as captured by the NoCord impression material.

in these situations but, as previously discussed, can restart sulcular oozing when removed, impeding the impression. Sulcular troughing with a soft-tissue diode laser can be effective in many cases to expose the restorative margin and can result in a sulcular impression zone that is free of blood and intracrevicular fluids, but, unfortunately, many doctors still do not own one, nor are they interested in buying one and learning how to use it properly.

Tear strength is critical for low-viscosity VPS materials (washes and syringeable) when in thin segments that are found when the margin is subgingival.[5] Poor tear strength can diminish the accuracy of the impression, making reading the restorative margin difficult for the lab team (Figure 1). Materials with high tear strength can be removed from the sulcus after setting without tearing or distorting the accuracy of the restorative margin (Figures 2 and 3).

NoCord System Recently Introduced

With all the previously discussed clinical issues and challenges in mind, a material has been developed (NoCord [Centrix Dental]) that will retract tissue (slightly expansive), control bleeding in the sulcus, and become part of the final impression. This eliminates the separate steps that are required to control sulcular bleeding and to gain retraction, thus shortening the chair time involved and lowering the material and overhead (time) costs typically associated with taking quality fixed prosthetic impressions. NoCord provides the clinician with unique performance benefits. In many cases, it can eliminate separate retraction steps. In other cases (such as larger and complex multi-unit cases), it can reduce the need for second cords as well as other secondary clinical steps. For almost all cases, having the impression material with the astringent (NoCord Wash Material [Centrix Dental]) injected in/around the sulcus and lying against the gingiva prevents re-bleeding and oozing. This recently introduced impression material makes it faster and easier to take quality and detailed impressions.

The NoCord system comprises 2 components: a light-body VPS (NoCord Wash Material) and a heavier body tray material (NoCord MegaBody Tray Material). NoCord Wash Material, a light-body VPS containing 15% alum (as an astringent agent) is utilized to manage sulcular bleeding and to provide some dilation of the sulcular soft tissue. This is dispensed into the sulcus from the automix impression gun using an 18-ga (green) tip snapped onto a yellow hub mix-tip. The material has good tear resistance in the sulcus and, in thin segments, retains its set integrity.

NoCord MegaBody Tray Material is designed to be used with the NoCord Wash Material. The heavier body of the MegaBody aids in driving the wash material into the sulcus, helping in dilation of the soft tissue and permitting the astringent in the wash to control sulcular bleeding during material setting. The harder setting of the MegaBody material also stiffens the dual-arch tray if/when that style tray is used; this helps to counter any tray distortion from when the patient bites into the impression as it's inserted intraorally. The stiffness of this material is also beneficial when taking an open-tray implant impression, as it will help prevent movement of the open-tray impression copings contained in the impression upon intraoral removal. NoCord MegaBody is available in a cartridge fitting into a standard impression gun (Figure 4) and also as a larger cartridge for bulk mixer units (MegaBody Tray Material 380) (Figure 5). The bulk cartridge contains material equal to 7.5 automix cartridges. Bulk cartridge dispensing makes it easier to dispense the material for those with smaller hands or those clinicians who possess less hand strength.

NoCord allows better tissue retraction with less time and does not affect impression accuracy.

Following preparation of the teeth, the tray to be used is filled with the MegaBody tray material (Figure 6). The NoCord Wash tip is placed into the sulcus and material expressed as the tip is moved slowly around the preparation (Figure 7). Additional material is expressed to completely cover the prepared tooth (Figure 8). The previously filled tray is inserted and held in place when the 2 materials complete setting. When a dual-arch tray is utilized, the patient is guided into occlusion and then instructed to bite gently (Figure 9). Upon setting (4 minutes), the impression is removed and inspected for accuracy of the margin and for any voids in critical areas (Figure 10). Occasionally, as with all impression materials, some detail may not have been adequately captured. Should a void be noted in the area of the margin or on the tooth preparation, the impression can be thoroughly dried, all the teeth areas on the preparation side of the impression can be filled with additional NoCord Wash material, and the impression can be reseated. The previously taken impression acts like a custom tray to force the new wash material into the sulcus and around the preparations to capture any missing details.

DISCUSSION

Traditionally, gingival retraction allows capture of the restorative margin by the impression material-involved retraction cords either with or without hemostatic agents in the cord. This increased treatment time and physical trauma from subgingivally packing the gingival tissue with cord could initiate sulcular bleeding upon removal of the cord in some patients. Retraction pastes containing chemicals to dilate the tissue and control hemorrhage in the sulcus were introduced as an alternative to cords, allowing injection into the sulcus with less trauma than with cord placement. The logical progression to tissue retraction was to have the final impression material have the ability to retract the tissue, control sulcular hemorrhage, and not increase the treatment time that had been required when using cords and pastes. NoCord accomplishes those goals, providing accurate impressions with good tear strength with the wash material and good body to the tray material (MegaBody), allowing the tray material to drive the wash into the sulcus and dilate the tissue to capture the margins.

NoCord Use in Taking Digital Impressions

Digital impressions still require visualization of the restorative margin and, when those are equigingival or subgingival, some tissue retraction is still necessary. As discussed, removal of retraction cords or pastes may lead to spontaneous bleeding,

especially in those patients on blood thinners. Utilization of NoCord to retract the tissue and dilate the sulcus to permit intraoral scanning of those subgingival margins will also provide a "backup" impression should the lab have issues with the digital impression. This also allows the lab team to pour up the impression to have a solid model to check and to adjust occlusion instead of CAD/CAM milling a model. If in-office milling is being performed based on the digital scanning (such as with CEREC [Dentsply Sirona]), the clinician can simply place NoCord Wash at the desired preps and partially fill a dual-arch tray only at the prepared teeth, thus yielding better retraction than with traditional methods.

IN SUMMARY

Fixed prosthetics will always require some type of impression, be it traditional or digital. Although the use of digital impressions (scanning) is growing, traditional physical impressions still make up the vast majority of impressions captured today. Accurate capture of the restorative margins is critical to the fit of the resulting restorations. As described in this article, NoCord allows better tissue retraction with less time and does not affect impression accuracy. Furthermore, it can be used for traditional impressions or as an adjunct for digital impressions.✦

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