Extending the use of rubber dam isolation: Alternative procedures. Part III
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This paper, the third of series, describes additional modified rubber dam utilizations that are generally not attempted with restrictive orthodox application methods. Part III offers practical hints and other means of retention with the emphasis on pedodontic applications. (Quintessence Int 1993;24:237-244.)

Occult caries and the role of the rubber dam

One of the advantages of using rubber dam that is seldom discussed in textbooks on operative dentistry is that minimal occlusal caries is often barely visible without the color contrast of the rubber dam. The rubber dam thus serves as an adjunctive diagnostic aid that is particularly welcome when a carious lesion is located beneath an apparently intact enamel surface. These lesions are often called occult caries.1,2 The pattern of occlusal caries has changed, and it is accepted that occlusal caries has actually become more difficult to diagnose in more recent years.3,4 It is for this reason that the clinician should resist the impulse to restore the “minimal carious pedodontic lesion” without the aid of rubber dam isolation. In the restoration of a mandibular first molar (Figs 1a to 1c), single-tooth isolation has yielded most of the advantages of traditional quadrant isolation in a fraction of the time required for traditional full-quadrant application.

The clinician who is able to provide the pedodontic patient with an array of conservative restorative options must accept the fact that perfection of isolation is a prerequisite for all meticulous restorative applications. For this “glass-ionomer rest-a-seal,” six different materials were used during the restorative process.5 Continued research and clinical study has and will continue to provide material improvements. Clinicians owe it to their patients to provide them not only with the best materials, but to provide optimal care in the delivery of these frontier materials. The key to increasing the potential for greater application and utilization of these materials lies in routine application of rubber dam.

A case for routine rubber dam isolation in pedodontics

The value of the rubber dam in pedodontic applications is that much more crucial than in adult applications, because the factors detrimental to good restorations are amplified many times.6 It is my belief that most operators are ill at ease with restrictive orthodox application methods in children and that there is a need for additional modified rubber dam utilizations. As with all other procedures in pedodontics, the approach to the child with regard to the rubber dam is all important.7 The acceptance of the rubber dam by children is directly related to the acceptance of the technique by the dentist. We are all versed in the use of words and explanations that introduce the child to this isolation option.8 However, its application to the tooth is another matter, and a great obstacle for most dentists to overcome.

The gingival tissue around primary and young permanent teeth is more bulky in relation to the exposed crown than that around the teeth of adults.9 No

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Careful visual examination enhanced by magnification and the contrast between the rubber dam and the tooth.

Initial enamel penetration to evaluate lateral extension of the carious lesion and appraise the range of the remaining occlusal shell of enamel.

Completed "glass-ionomer rest-a-seal." A conservative solution demonstrating the convenience of rubber dam isolation.

amount of mental imagery of rainy days and the need for a “tooth raincoat” will alleviate the pain of a retainer that has engaged the gingival tissues as the sole means of retention following an ineffectual inferior alveolar nerve block. The difficulty experienced in obtaining efficacious inferior nerve anesthesia in children is a result of failure to recognize the changing position of the mandibular foramen with age.

Too often well-intentioned operators begin a tooth preparation with cotton rolls in place but finally, after struggling with the child through most of the procedure, will capitulate and allow the field to become wet.

The techniques depicted in Figs 2 to 8 introduce modified application procedures that will allow the routine use of rubber dam isolation for almost all pedodontic restorative procedures.

Customizing retainers

Retainers, to be secure, must usually be placed below the tooth's height of contour. Some teeth, especially primary molars, have a height of contour well below the crest of the surrounding gingival tissue. In some instances caries extend subgingivally, further compromising the retentive capacity of a tooth. In these instances modification of retainers is beneficial. The retainer is customized until the prongs engage and the retainer no longer teeters from the tension of the rubber dam.

Figures 2a to 2f depict the value of retainer modification as an accurately contoured retainer allows uncompromised moisture control in what would normally be a difficult and exacting pedodontic application.
Fig 2a. Occlusal view demonstrating enamel hypoplasia of the maxillary left molar in a 4-year-old patient. The retainer has failed to provide tissue retraction during preparation phase.

Fig 2b. Tooth preparation has been completed under rubber dam. The dam is removed to facilitate a reduction in palatal gingival height with the use of an electrotome.13

Fig 2c. One week after preparation, the final impression is made.

Fig 2d. The retainer is customized by using the unsectioned stone pour as a reference.

Fig 2e. The accurately contoured retainer permits uncompromised moisture control in what would normally be a difficult and exacting pedodontic application.

Fig 2f. The marginal integrity of the acrylic resin inlay is the result of uncompromised isolation and moisture control.
All of the alternative rubber dam applications that were introduced in part II of this article are applicable to pedodontic situations. For the restoration of an enamel defect in an 8-year-old patient, a single-holed dam is retained by two anterior anchorings (Hygienic).

The application of a retainer to the adjacent primary molar and the mesial retention provided by the toggle of the automatrix (Caulk/Dentsply) completes the isolation for the replacement of a defective silver alloy restoration.

The adjacent partially erupted permanent molar is not conducive to traditional retentive attempts. Adaptation of the retainer to the tooth to be restored is furthermore hampered by the toggle of the matrix.

An armamentarium of four retainers with modifications to the four proximal prongs is enough to cover all the permutations of toggle position on these primary molars. In this instance, a fissure bur is used to shape the buccal jaw and the mesiobuccal prong.

This modification facilitates close approximation between the buccal jaw and the matrix band.

The "sprung" action of the retainer further approximates the interproximal portion of the matrix band, enhancing the integrity of the marginal ridge of the final restoration.
Figs 5a and 5b The automatrix system is the matrix of choice in this instance, because the proximity of these two Class II lesions makes the use of Tofflemire retainers (Teledyne) cumbersome. The use of palatally inserted gingival wedges together with the buccal toggles creates an ideal rubber dam retainer. Once the "automatrix retainer" is cinched in place, a two-holed rubber dam is stretched and then slipped over and under both toggles and wedges. A piece of waxed dental tape is used to maneuver the interseptal rubber between the automatrix contact, completing the isolation.

Fig 5a The toggle of an automatrix gives sufficient retention buccally. However, the retentive limitations of the automatrix system are apparent with lingually blocked out premolars. These are notoriously unyielding retentive participants, because the jaws of a retainer are unable to engage the reciprocal undercuts. This retainer will spring off the tooth once the dam is put under tension. Threading floss around the retainer is recommended whenever the retainer is applied to the tooth prior to dam application.

Fig 6a A slight modification to the matrix provides the necessary lingual retention. Two vertical incisions are made from the bottom up, extending to a third of the matrix width. This section is then reflected out to create a retaining ledge. The length of this ledge is approximately two thirds the mesiodistal dimension of the tooth.
Figs 7a and 7b  The ease of application of the modified automatrix retainer makes it the retainer of choice when the patient requests nonanesthetized treatment. Note the complete absence of the gingival laceration that usually accompanies retainer application to molars in adolescents. A single-holed rubber dam is stretched over the matrix band. A thin burnisher is then used to reflect the rubber dam under the toggle buccally and under the newly created matrix ledge linguually.

Figs 8a (left) and 8b (above)  A slight rotation of the retainer permits adequate isolation to complete the restoration on this maxillary first molar. The clinical standard of the restoration is maximized as the band-tooth gap is first debrided by means of a Cavijet (Dentsply) and then a fissure sealant is allowed to flow into the gap to minimize the postorthodontic complications of decalcification and discoloration. This is a natural progression to the work done on the penetration of fissure sealants into contraction gaps of composite resin. The occlusion is adjusted once the dam has been removed.

Discussion

It is only with the regular use of rubber dam on as many procedures as possible that practitioners are able to build up an experience of creative, useful rubber dam applications. The isolation procedure depicted in Fig 9 is submitted as justification for the opinion that isolation solutions are as infinite as the problems that spawn them. For many dental procedures, isolation of the working field is exceptionally difficult, even for those practitioners who are familiar with all the variations of rubber dam application.

The rubber dam methods described in this series are not intended as a substitute for traditional rubber dam isolation. These techniques are primarily offered as a means to encourage the use of rubber dam on as many procedures as possible. Alternative techniques and practical hints are aimed principally at those dentists
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Fig 8d A wedge is added palatally to the buccal tube to create an impromptu clamp that provides adequate rubber dam retention in an otherwise inaccessible area.

Fig 8c (left) Traditional application of rubber dam is deemed impossible in the presence of an orthodontic appliance. Placement of a Class I amalgam restoration on the distoocclusal surface of the second molar would involve the removal of healthy tooth substance. A preventive resin restoration is the treatment of choice, provided that adequate isolation can be achieved.

Fig 9a The bulimic condition of this 24-year-old patient led to a loss of vitality of the maxillary left central and lateral incisors. The normal palatal morphology was lost, with the result that the palatal dam curtain kept overriding the access cavity. Traditional isolation with a universal double-bowed retainer would have resulted in trauma to the palatal epithelium.

Fig 9b The central wedge is inserted from a lingual direction, forcing the matrix strips into close approximation with the eroded palatal margins. The resultant isolation is adequate for completion of endodontics and immediate composite resin core restorations.
who have rejected the rubber dam in ignorance of its ease of application and versatility.

The dental profession has acknowledged its responsibility for occupational transmission of a number of serious and life-threatening infectious diseases, including human immunodeficiency virus. It is therefore incumbent on every dental clinician to ensure the end of an operatory interlude where little more than scant attention was paid to infection control practices. It is hoped that the techniques described here will help to restore the rubber dam to its rightful "routine use" status instead of the "occasional adjunct" status to which it was relegated in a recent article.

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References