Extending the use of rubber dam isolation: alternative procedures. Part I

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Most dentists are well aware of the value of the rubber dam in allowing technical excellence; however, few recognize the potential for protecting the dentist and staff against the ever-growing number of carriers of the hepatitis and human immunodeficiency viruses. The effectiveness of the rubber dam as an isolation barrier is dependent on the consistency of its application. Sporadic rubber dam application is therefore a weak link in an infection control program. This paper describes additional modified utilizations of rubber dam, uses that are generally not attempted with restrictive orthodox application methods. In addition, practical hints on other means of retention are offered, with the emphasis on nuisance-free and easy application. (Quintessence Int 1992;23:657-665.)

Introduction

Rubber dam isolation has undeservedly acquired the reputation of being “dentistry’s ugly duckling.” As a means of encouraging the use of rubber dam, dental educators have emphasized its various advantages, which have tended to center around the quality of the restorative product. Most dentists are therefore well aware of the value and numerous benefits of the rubber dam in allowing technical excellence. Some papers have attempted to introduce methods and techniques that prevent accidents during dental treatment. Nevertheless, few clinicians appear to recognize the potential for health and safety provided by the routine use of rubber dam isolation. The role of the dam in protecting the dentist and staff against the ever-growing number of carriers of hepatitis and the human immunodeficiency virus (HIV) must be reemphasized. This is not a new concept; others have reported on the role that rubber dam plays in preventing cross contamination and the spread of communicable diseases.

The quality of infection control as it relates to a patient’s well being during a dental procedure has come under the media spotlight as a result of a case of acquired immunodeficiency syndrome reputedly caused by HIV transmission from dentist to patient. Although the risk that a health care worker will transmit HIV is small—1 in 263,000 to 1 in 2,600,000—the ensuing media coverage greatly alarmed the public. The fact that 1,171 cases of acquired immunodeficiency syndrome have been reported among dentists, dental hygienists, and dental assistants throughout the United States since 1981 has also done little to instill confidence among patients in their safety. The consensus is that any risk, no matter how small, of HIV transmission from health care workers to patients must be taken seriously. Consequently, there has been a shift in emphasis on the cross-contamination pathway during dental procedures, as patients are questioning the HIV status of health care workers.

The following statement, by Prime, appears to be even more appropriate some 54 years after it was read at the 78th annual session of the American Dental Association: “The only thing that permits the man not using the rubber dam to continue in practice is the fact that the public does not know what you and I know about the rubber dam, the role it plays in operative procedures.” It has been suggested that the routine use of rubber dam isolation can result in a distinctly lower rate of disease transmission.

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dam can contribute significantly to the overall infection control program in the dental office. The rubber dam offers an adjunctive method of reducing the spread of infectious disease agents in the dental office and, more importantly, provides barrier protection at the source of microbial contamination. Yet it is regrettable that, "no other technique, treatment, or instrument used in dentistry is so universally accepted and advocated by the recognized authorities and so universally ignored by the practicing dentists." The leading yardstick of an infection control program lies in the consistency of its application. Sporadic rubber dam application is a weak link in the "infection control checklist." It is indisputable that the disclosure of the HIV status of both patient and health care worker cannot be relied upon. It is for this reason that every attempt should be made to reintroduce rubber dam isolation to its rightful place in the dental operatory.

The insistence of dental educators in promoting "textbook-perfect" rubber dam isolation and the demand of traditional application methods on utilizing retainers with rubber dam material are among the reasons that so few dentists use rubber dam routinely.

Most practicing dentists consider rubber dam retainers to be an indispensable component of the rubber dam isolation armamentarium. Rubber dam retainers are used to hold the distal ends of the rubber around the most posterior tooth, providing retention of rubber dam material, which is accepted as a fundamental requirement in the successful preparation of the operating field during the rubber dam isolation procedure. The selection of these retainers is generally made according to the recommendations of the manufacturers or lists of preferred retainers used by individual clinicians. However, successful retainer application is ultimately still based on an individual's practical experience and, for this reason, presents the biggest hurdle to the routine use of rubber dam.

I have found that the application methods traditionally used are, in many cases, antiquated, because they were designed to retain rubber dam material of a greater thickness than that currently available. When thinner rubber dam material is utilized, alternative retention methods make the isolation procedure far easier and less time-consuming.

This three-part paper describes additional, modified uses of rubber dam that are generally not attempted with restrictive orthodox application methods. In addition, practical hints on alternative means of retention are offered, with the emphasis on nuisance-free and easy application.

**Additional uses for rubber dam isolation**

**Attachment of prosthesis to osseointegrated implants**

A large number of potential accidents are associated with the delivery of health care, accidents that can and should be avoided. The increasing number of malpractice suits is a reflection that the delivery of dental care is as prone to accidents as any other health service. A major hazard associated with the delivery of routine dental care is aspiration or swallowing of dental instruments and materials. The use of rubber dam isolation as a barrier against the aspiration or swallowing of endodontic instruments has long been advocated in dental literature. Nonetheless, little attention has been directed toward the potential problem of aspiration during restorative dentistry procedures.

Techniques that overcome the difficulty of rubber dam application to crownless and cone-shaped teeth during endodontic procedures have been accepted as standard practice. Similarly, there should be no exceptions to the value of patient protection during implant procedures. Further clinical studies are needed to ensure that the value of patient protection is extended to include all restorative procedures. To date no cases of litigation following the inhalation of an implant component have been recorded, yet it is inevitable that in the years to come prosthodontic treatment planning will have to make allowance for isolation of the working field during the delivery of all restorative options.

Although it is unlikely that rubber dam application will ever routinely accompany the attachment phase of the implant-supported prosthesis, it is a valuable aid when treating a patient suffering from a disease in which muscular control is less than ideal. The transfer and placement of screws intraorally in situations of limited access should, where possible, be done with the protection of rubber dam isolation. It is no less hazardous for a patient to inhale an implant component than it is an endodontic reamer.

The two cases depicted in Fig 1 and 2 serve as indications of further clinical applications open to clinicians as they progress toward routine patient protection.

**Placement of fixed orthodontic brackets**

Although a survey of the literature shows universal agreement about the need to maintain a completely dry working field during bonding procedures in orthodontics, there is not a single reference to the advantage of using rubber dam in attaining uncompromised isolation. The advantages of bonding under rubber
Fig 1a. Preoperative retainer selection for the placement of a four-unit implant and tooth-borne prosthesis. The flanges of a No. 00 retainer are smoothed and polished to prevent their nicking the surface of the titanium abutment.

Fig 1b. A three-holed rubber dam (previously punched using the cast as reference) is stretched over the abutments. Digital pressure, applied to the dam curtain, provides complete marginal exposure.

Fig 1c. The splinted tooth abutments are cemented into place and the implant-borne prosthesis is screwed down after the precision attachment is engaged.

Fig 1d. An occlusal view immediately postoperatively.

Fig 2a. Lateral intraoral view of a mandibular arch with two abutments isolated with the aid of “anterior-sized” anchorings.

Fig 2b. Intraoral view of the prosthesis. The isolation setup has been designed to facilitate the concurrent placement of the freestanding fixed partial denture and the porcelain laminate veneer.
Fig 3a  The hands-free aspect allows the operator to take full advantage of measuring devices, which allows accurate bracket placement.

Fig 3b  The proximity of the wings of the rubber dam retainer to the buccal tube during the band cementation phase inhibits placement of the molar bands.

dam are the same irrespective of the application; however, in no procedure is the “hands-free” aspect of rubber dam isolation as welcome as in placement of orthodontic brackets. Tight cervical adaptation and ligation of rubber dam material around each tooth are necessary if the operator is to capitalize on this isolation technique. The entire arch is cleaned, conditioned, sealed, and bonded as one unit.

The hands-free aspect allows the operator to take full advantage of measuring devices, which allow accurate bracket placement (Fig 3a). The operator can work in a relaxed manner and obtain optimal bond strength for each bracket. There is no need to hurry, since there is no chance of moisture contamination. The transfer, positioning, fitting, and removal of excess adhesive is thus enhanced. An etching time of 15 seconds is adequate. Localized enamel tearouts during debonding are not a complication following bonding under rubber dam isolation, because the minimum amount of adhesive is used.32,33

The apparent difficulty in cementing the band with the retainer in situ during “traditional” rubber dam isolation is likely the reason that this isolation technique has not been encouraged for orthodontic bonding. The proximity of the wings of the rubber dam retainer to the buccal tube during the band cementation phase inhibits placement of the molar bands (Fig 3b). The solution is to ease the retainers off the molars, while maintaining bidigital pressure on the dam curtains, thus maintaining molar isolation during band cementation (Fig 3c). Traditional retention is terminated, while rubber dam stability is maintained by the newly cemented bands (Fig 3d). The initial “isolation hassles” pay dividends as the operator is able to work through the strictly mechanical ligating phase with speed and accuracy and without fear of traumatizing the tissues (Fig 3e). The floss slip knots are released with a gentle tug, the interdental strips are cut, and the rubber dam is removed.

Removal of cast restorations

Removal of cast restorations under rubber dam protection is far more comfortable for the patient, who does not have to contend with the residual “filings.” There is no chance that a patient will aspirate a sectioned restoration, and the occasional unexpected pulpal exposures are immediately well isolated. The fact that the removal of cast restorations is almost always an elective procedure allows a certain degree of foresight in the isolation planning. This foresight provides patient comfort and protection as well as operator ease (Figs 4 to 7).

Manipulation of the interdental latex strip

There is a direct relationship between the need to isolate an operative area and the degree of difficulty experienced in attaining adequate isolation; ie, the areas that require arduous rubber dam application skills are the very areas where the application is of benefit. The apparent difficulty in satisfying the requirement of sufficient interproximal access during the restorative procedure is often the criterion that sways the clinician in favor of the less-than-adequate option of cotton roll isolation. The benefit of the rubber dam is lost in
Fig 3c  Bi-digital pressure on the dam curtain maintains molar isolation during band cementation.

Fig 3d  Retainerless, the patient is allowed a welcome interlude while the cement sets.

Fig 3e  The initial “isolation hassles” pay dividends as the operator is able to work through the strictly mechanical ligating phase with speed and accuracy without fear of traumatizing the tissues.

Fig 4a  Cast cores have been placed on the premolars. The defective crown on the canine is to be sectioned under the same isolation procedure.

Fig 4b  The ligature retention negates the need for a retainer anterior to the operatory field. Digital pressure is applied to the buccal curtain, exposing the coronal margin during sectioning. The floss stabilizes the dam during this manipulation.

Fig 5  Contralateral isolation is secured with ligature retention anteriorly. Once the crowns have been removed, the dam is replaced with a new dam, which is prepunched according to the requirements of the restorative procedures.
Fig 6 A retainer that does not provide close buccal adaptation has been selected, because the bur must have access to the sulcular area during the sectioning of the circumference of this subgingivally placed crown.

Fig 7 General field isolation of this cantilevered abutment provides all the advantages of traditional retention in a fraction of the placement time.\textsuperscript{32,33}

Fig 8a Premolar previously prepared to receive a cast post and core. The rubber dam covers the root surface margin, providing cumbersome and inadequate isolation.

Fig 8b With the help of a beaver-tail burnisher, the rubber dam is stretched over the buccal flange, creating the necessary access for post cementation.

Fig 8c Once the post is in position, the dam is returned to its circumferential position and the adjacent tooth is prepared. The interdental latex strips are then cut to change to general field isolation for the core preparation.

Fig 9a With insufficient preplanning, the wings of the retainer prevent adaptation of the floss to the interproximal area.
Figs 9b and 9c  Floss has been threaded through the holes in the retainer, ensuring maximal adaptation to the gingival wall on withdrawal and optimizing interproximal finishing.

Fig 10a  A provisional occlusal stop is needed on tooth 37 while the patient undergoes the periodontal phase of therapy. The rubber dam is moved mesially, temporarily facilitating the required embrasure access for matrix manipulation. The proximal corners of the tooth are closely engaged by the buccal and lingual flanges, providing adequate retention, but preventing complete matrix adaptation along the gingival box.

Fig 10b  The pressure of the retainer is momentarily released, allowing the strip matrix to be gently eased into position. The retainer is then allowed to spring back into contact with the tooth so that the matrix is adapted even more tightly.

Fig 10c  The dam is flicked back into position and a wedge is driven interdentally. Floss is passed into the embrasure at this stage, anticipating interproximal burnishing once the matrix has been removed.

Fig 10d  The restoration is placed. The final occlusal adjustment is made after rubber dam removal.
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Figs 11a and 11b A radiograph has indicated the presence of a subgingival carious lesion mesial to the first molar. The cavity preparation will of necessity extend below the interdental latex strip.

Fig 11c Flicking the interdental strip into the next embrasure creates the required access for caries excavation and refinement of the gingival floor.

Fig 11d Cavity preparation is complete. The matrix is adapted. The rubber dam is returned to its interproximal position. A wedge is placed above the dam and the cavity cleansing is completed.

those instances where the rubber dam is rejected on the basis of the priority of interproximal access.

General field isolation is a solution, because it permits complete interproximal access. However, general field isolation nullifies the protective, retractive, and compressive features of traditional rubber dam application and is best avoided when possible. The practical solution of interdental latex strip manipulation permits all proximal restorations to be completed under rubber dam isolation. Figures 8 to 11 provide examples of this technique.

A case has been reported in which a post and core was dropped into a patient's pharynx during the cementation stage. The supine position of the patient increases the risk of this event. It is easily avoided with routine rubber dam application (Fig 8).

Interproximal access is of primary consideration when retainers are chosen for rubber dam stability during bonding procedures. The interproximal finishing strategy must be planned well in advance of the adhesive bonding phase, because special attention must be paid to the prevention of periodontal irritation caused by excess composite resin (Fig 9).

When the rubber dam interferes with matrix adaptation, the rubber dam can be displaced temporarily to facilitate the required embrasure access (Fig 10). The retainer is momentarily released, allowing the matrix to be moved into position. The dam is flicked.
back into position and a wedge is driven interdentally. The presence of a subgingival carious lesion will necessitate a cavity preparation that extends below the interdental latex strip of the rubber dam. Flicking the interdental strip into the next embrasure will create the required access (Fig 11).

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References