

Recent Advances In Isolation In Dentistry

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Abstract

The Effective Control Of Moisture And Microbes Is Necessary For The Success Of Restoration Procedures. Isolation Should Prevent Contamination Of The Operatory Field By Moisture, Bacteria And Blood. Isolation Is Useful In Increased Salivation In Patient, Excessive Tongue Movements, Shorter Duration Of Treatment And Decreases Danger Of Aspiration Of Foreign Particles. It Is Convenient To The Operator Since It Improves Visibility & Properties Of Restorative Materials. Different Isolation Method Has Been Widely Used In Dental Restorative Treatments. There Are Alternatives To Rubber Dam, But They Offer Only Partial Isolation And Insufficient Soft Tissue Retraction. This Article Focuses On The Practical And Clinical Application Of Different Isolation Aids And A Clear Protocol And Strategy As Well For Isolation.

Key Words: Isolation, Rubber Dam, Cotton Rolls, Throat Shield, Gauze Pieces, Drugs

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The rubber dam is used to define the operating field by isolating one or more teeth from the oral environment. The dam eliminates saliva from the operating site and retracts the soft tissue.

Advantages

The advantages of rubber dam isolation of the operating field include (1) a dry, clean operating field; (2) improved access and visibility; (3) optimization of dental material properties; (4) protection of the patient and the operator; and (5) operating efficiency.

Disadvantages

Rubber dam use is low among private practitioners. Time consumption and patient objection are the most frequently quoted disadvantages of the rubber dam. However, the rubber dam may usually be placed in less than 5 minutes. The advantages previously mentioned certainly justify any time utilized in accomplishing proper placement. Certain situations may preclude the use of the rubber dam, including teeth that have not erupted sufficiently to support a retainer, some third molars, and extremely malpositioned teeth. In addition, patients may not tolerate the rubber dam if breathing through the nose is difficult.

I. NEWER ADVANCES IN RUBBER DAM SHEET

Hygienic dental dam is a non-latex rubber dam for patients with latex allergies. It is a powder-free, synthetic dam and comes in just one size i.e. 6 X 6 inches. It has a shelf life of 3 years and has the same tensile strength that of a latex dam.

a. Derma dam (Ultradent Products, Inc, USA)

Derma dam is also a non-latex and powder-free rubberdam which removes the possibility of latex reactions. It has a low content of surface proteins and has an advantage of having low dermatitis potential, reduced allergic reactions and greater tear resistance.

- b. **Flexi dam (Coltène/Whaledent)** Flexi dam is an elastic nonlatex dental dam made from an elastic plastomer. It can be elongated more than 1000 % before tearing. It is more tenacious than latex dam and is similar to place.

II. Newer advances in rubber dam clamp

Clamp with long guard extension

Clamp with long guard extension has a larger wing which is used for retraction of the tongue. These clamps retract and protect the cheek and tongue along with isolation. They can be used with gauze or cotton rolls just for the retraction of tongue and cheek.

Tiger clamp

Tiger clamps are clamps with serrated jaws. These serrations increase the stabilization of the clamp on the partially erupted or broken down teeth.

S-G (Silker-Glickman) clamp

S-G clamp is a clamp with anterior extension which allows for retraction of the dam around a severely broken down tooth, and the clamp itself is placed on a tooth proximal to the one being treated. It is made from durable cast stainless steel, which is autoclavable, corrosion-resistant, flexible and long lasting. It is ideal clamp for molar isolation. Its extended wings allows for rubber dam placement around the teeth with minimal tooth structure.

Super Clamp

Super clamp comes with a pre-cut rubber dam material designed to fit the clamp. It is very simple to use, quick and easy to place. It allows for easy evacuation of oral fluids with a saliva ejector or a high-volume evacuator, and also can be used without the rubber dam to protect only the tongue and soft tissues. The clamp is made out of a thin, flexible stainless steel. It can be sterilized by autoclave, chemiclave or even dry heat. However, it has one disadvantage that, it cannot be used for anterior teeth. It comes in three sizes: L- large clamp for molars, M- medium clamp which can also be used for molars and S- small clamp which can be used for premolars.

Gold colored clamp

Gold colored clamps have diamond grit on their jaw to improve the retention of the clamp

Rubber dam clamp forceps

Rubber dam forcep is necessary to open the clamp and position it around the tooth. The Ivory forceps are preferable, because they allow the dentist to apply direct pressure toward the gum, which is frequently necessary to position the clamp securely below the bulge of the tooth crown.

Newer advances in rubber dam frames

The older frames have numerous disadvantages such as, requiring more time for positioning, they completely cover the patient's nose and mouth, giving the patient unpleasant of sensation suffocation and they do not cause retraction of the lips or cheeks. Recently newer frames have been marketed into endodontic practice which has many added advantages.

Articulated frame

Safe T- frame

Recent alternatives to Rubber Dam

Insti dam (Zirc)

Insti dam has an in-built flexible radiolucent nylon frame eliminating the need for a separate one. It is made of translucent natural latex that is very stretchable, tear-resistant and provides easy visibility. There is an off-centre pre-punched hole which customizes fit to any quadrant. More holes can be added if desired. Its compact design is just the right size to fit outside the patient's lips. It has the following advantages.

Handi dam (Aseptico)

Handidam is a pre-framed rubber dam which eliminates the need for traditional frames.

Dry dam

Dry dam is an alternative type of rubber dam which does not require a frame. It consists of a small rubber sheet set in the centre of an absorbent paper with light elastics on either side to pass over the ears. It fits

like a face mask with an absorbent lining to give patient comfort and reduced risk of allergic reaction. It is available in medium and thin varieties. It is useful for quickly isolating anterior teeth but it is not useful for isolation of posterior teeth. It has an added disadvantage of not being useful in a bleaching procedure due to the absorbent nature of the paper surrounding it.

Framed Flexi Dam (Coltène/Whaledent) The Hygienic non-latex flexi dam is also available with a convenient, built-in-frame. The flexible frame is designed with a convenient working size of 100 mm x 105 mm to ensure easy placement without limiting access. The dam has good tear resistance and is latex allergy free and odourless. The smooth surface of the plastic frame helps to maximize patient comfort when positioned against their skin.

ii. **Opti Dam (Kerr)**

OptiDam is the first rubber dam with 3-dimensional shape and nipple design. The 3-dimensional shape of Opti Dam and the anatomical frame shape match the contours of the mouth. This allows greater access and improved visibility to the working area. This also allows reduced tension resulting in easier rubber dam application and low risk of clamp displacement. Opti Dam is available in two versions: anterior and posterior. Opti Dam involves much less preparatory work than for conventional rubber dams. i.e. no marking of the tooth position because of outward oriented nipples and no hole-punching procedures as the nipples are easily cut. It offers maximum patient comfort and allows them to breathe with no pressure around the nasal area.

Recent Accessory to Rubber Dam

1. Cushees
2. Wedjets

III. Allergic Reaction After Rubber Dam Placement

Cotton Roll Isolation and Cellulose Wafer

Absorbents such as cotton rolls also may provide isolation. Absorbents are isolation alternatives when rubber dam application is impractical or impossible.

Cellulose wafers may be used to retract the cheek and provide additional absorbency. After the cotton rolls, cellulose wafers, or both are in place, the saliva ejector may be positioned. When removing cotton rolls or cellulose wafers, it may be necessary to moisten them using the air-water syringe to prevent inadvertent removal of the epithelium from the cheeks, floor of the mouth, or lips.

Throat Shields

When the rubber dam is not being used, throat shields are indicated when the risk of aspirating or swallowing small objects is present. Throat shields are particularly important when treating teeth in the maxillary arch. A gauze sponge (5 × 5 cm), unfolded and spread over the tongue and the posterior part of the mouth, is helpful in recovering a small object (e.g., an indirect restoration) should it be dropped. It is possible for a small object to be aspirated or swallowed if a throat shield is not used.

High-Volume Evacuators and Saliva Ejectors

Air-water spray is supplied through the head of the high-speed handpiece to wash the operating site and act as a coolant for the bur and the tooth. High-volume evacuators are preferred for suctioning water and debris from the mouth

Retraction Cord

When properly applied, retraction cord often may be used for isolation and retraction in direct procedures involving accessible subgingival areas and in indirect procedures involving gingival margins. When the rubber dam is not used, is impractical, or is inappropriate, retraction cord, usually moistened with a noncaustic hemostatic agent, may be placed in the gingival sulcus to displace the gingiva and allow local control of sulcular seepage and hemorrhage. To achieve adequate moisture control, retraction cord isolation should be used in conjunction with salivation control. A properly applied retraction cord improves access and visibility and helps prevent abrasion of gingival tissue during tooth preparation. Retraction cord may help limit excess restorative material from entering the gingival sulcus and provide better access for contouring and finishing the restorative material. Anesthesia of the operating site may or may not be needed for patient comfort. The operator chooses a diameter of cord that will fit in the gingival sulcus and cause lateral displacement of the free gingiva ("opening" the sulcus) without "blanching" it (i.e., without causing tissue ischemia secondary to pressure from the cord). The length of the cord should be sufficient to extend approximately 1 mm beyond the gingival width of the tooth preparation. A thin, blunted instrument blade or the side of an explorer is used to progressively

insert the cord. To prevent dislodgment of previously inserted cord, the placement instrument should be moved slightly backward at each step as it is stepped along the cord. Cord placement should not harm gingival tissue or damage the epithelial attachment. If ischemia of gingival tissue is observed, the cord may need to be replaced with a smaller diameter cord. The objective is to obtain minimal yet sufficient lateral displacement of the free gingiva and not to force it apically. Cord insertion results in adequate displacement of the gingival crest in a short time. Occasionally it may be helpful to insert a second, usually larger, cord over the initially inserted cord. In procedures for an indirect restoration, inserting the cord before removal of infected dentin and placement of any necessary liner assists in providing maximum moisture control. It also opens the sulcus in readiness for any beveling of the gingival margins, when indicated. The cord may be removed before beveling or it may be left in place during beveling. Inserting the cord as early as possible in tooth preparation helps prevent abrasion of the gingival tissue, thus reducing the potential for bleeding and allowing only minimal absorption of any medicament from the cord into the circulatory system.

For the retraction of soft tissue, three principle methods are available for use today: 1) mechanical; 2) chemomechanical; and 3) electrosurgical. The chemomechanical technique is probably the most widely used but its limitations are time consuming, painful, need for local anesthesia and injury to epithelial tissue and gingival recession.

Mirror and Evacuator Tip Retraction

A secondary function of the mirror and the evacuator tip is to retract the cheek, lip, and tongue. This retraction is particularly important when a rubber dam is not used.

Mouth Props

A potential aid to restorative procedures on posterior teeth (for a lengthy appointment) is a mouth prop. A prop should establish and maintain suitable mouth opening. Its use may also help relieve masticatory muscle fatigue. The ideal characteristics of a mouth prop are as follows: 1. Adaptable to all mouths. 2. Easily positioned, without causing discomfort to the patient. 3. Readily adjusted, if necessary, to provide the proper mouth opening or improve its position in the mouth. 4. Stable once applied. 5. Rapidly removed in case of emergency. 6. Sterilizable or disposable. Mouth props are generally available as either a block type or a ratchet type. Although the ratchet type is adjustable, its size and cost are disadvantages. The use of a mouth prop may be beneficial to the operator and the patient. The most outstanding benefits to the patient are relief of responsibility of maintaining adequate mouth opening and relief of muscle fatigue and associated discomfort. For the dentist, the prop ensures constant and adequate mouth opening and permits extended or multiple operations, if desired.

Drugs

The use of drugs to control salivation is rarely indicated in restorative dentistry and is generally limited to atropine. As with any drug, the operator should be familiar with its indications, contraindications, and adverse effects. Atropine is contraindicated for nursing mothers and patients with glaucoma.

Salivation is a double-edged sword. It is desired for its protective function to the oral structures but undesirable due to the need for isolation during dental procedures. Atropine sulphate drops are known to decrease salivary secretion due to their muscarinic antagonistic activity.

DECREASE IN SALIVATION AFTER ATROPINE It has long been proven that salivary secretion is extremely sensitive to inhibition by antimuscarinic agents. [26] In the current study it was recorded to have a stark drop in both USFR and SSFR over a period of 90 minutes after administration of atropine drops. (Graph 2) The unstimulated salivary flow rates in the children receiving atropine sulphate dropped by 80.3% in 90 minutes whereas stimulated salivary flow rate decreased by 79.4%. This seemed to echo the findings by Volz-Zang et al (1995) who reported the decline of 84.3% salivation after oral atropine administration in their subjects. [27] This also substantiates the already established fact of the antisialogogue activity of the drug as demonstrated by Bowman and Rand (1980) [28] and Iliopoulou et al (1981) [29] at the dosage and route chosen [7,9] within a span of 90 minutes.

1. Most of the drugs commonly used for gingival retraction are effective in shrinking the gingival tissues.
2. Zinc chloride is caustic and prolonged application or high concentrations will cauterize the tissue.
3. Negatan is highly acid and decalcifies the teeth.
4. When very high concentrations or amounts of epinephrine are applied locally to lacerated tissue, epinephrine can be absorbed and cause an increase in the heart rate and blood pressure, which could be dangerous for patients with cardiovascular disease, hyperthyroidism, and to certain hypersensitive individuals.
5. The application of high concentrations of epinephrine to large areas of lacerated or abraded gingival tissues should be avoided

The use of sedatives has established efficacy and safety for managing anxiety regarding dental treatment. This article will provide essential information regarding the pharmacology and therapeutic principles

that govern the appropriate use of orally administered sedatives to provide mild sedation (anxiolysis). Dosages and protocols are intended for this purpose, not for providing moderate or deeper sedation levels. Oral sedation has its limitations, however. Oral sedation can help the majority of patients with mild to moderate levels of fear and anxiety but may be ineffective in patients with higher levels of anxiety.

Comfortable position of patient and relaxed surrounding

Local anesthesia The rubber dam is usually placed after local anesthesia has been administered and while waiting for that anesthetic to take effect. Local anesthesia is often used prior to rubber dam clamp application in pediatric patients to reduce discomfort and pain.

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