

# Isolation of Teeth in Children: A Review

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## Abstract

Isolation is done for proper control of moisture, good accessibility and visibility, to provide adequate space for instrumentation and operation. Most of the children are non-cooperative during treatment. So, isolation is mandatorily necessary for pediatric patients. Studies have shown that there are successful retention rates of adhesive restoration when a rubber dam is used rather than any other isolation technique. The judicious use of rubber dam ensures greater patient comfort and delivery of high-quality dental care to pediatric patients.

**Keywords:** Access, Rubber Dam, Cotton Rolls, Isolation.

## Introduction

Any operative procedure needs adequate space over the operating field. There must be proper control of moisture, good accessibility and visibility as well as spacious for instrumentation around the working area. For easy manipulation this kind of environment is necessary. Isolation of the working area includes isolation from saliva, blood, gingival crevicular fluid and soft tissues like lips, cheeks, gingiva and tongue.

### Goals of Isolation:

**Retraction & Access:** Without proper retraction and access the details of any kind of operative procedure can not be managed. Maximal exposure of the operating site is provided by retraction access.<sup>1</sup>

**Moisture Control:** If the moisture in the mouth is not controlled, operative dentistry can not be executed properly. Elimination of gingival sulcular fluid, saliva and bleeding from the working area is referred to as moisture control. It also prevents the spray from hand-piece and debris of restorative material from being swallowed or aspirated.

**Harm Prevention 2:** Isolation of the operating field is done to prevent the patient from being harmed during the ongoing procedure. A patient may accidentally aspirate small instruments, restorative debris. Accidentally soft tissue may get damaged. Use of isolation is used both for harm prevention and patient comfort and operator efficiency.<sup>1,2</sup>

### Types of Isolation in Pediatric Patients<sup>3</sup>

A. Fluid absorbent B. Saliva ejector C. Rubber dam D. Use of Drugs

**Fluid Absorbents:** By absorption of salivary secretions, the isolation can be achieved. These are used for short periods when absolute dryness is not required. e.g. examining oral cavity, polishing fluoride application. Various materials that can be used for this purpose are- 1. Cotton rolls 2. Gauze or throat shields 3. Absorbent paper

**Cotton Rolls:** These are available in different sizes, cut to variant lengths with plain or woven surfaces. These are placed sublingually, over or lateral to salivary gland orifices. Cotton rolls slightly retracting the cheek provides visibility and access.<sup>1,2</sup>

**Gauze or Throat Shields:** It is used in pieces of 2''X2'' or larger. For large areas than cotton rolls, these are better suited. Gauze has less adherence to dry tissues and better tolerated by delicate tissues as compared to cotton.

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**Absorbent Paper:** These are of different shapes to fit various locations in the mouth. They are more absorbent.

**Saliva Ejectors & High Volume Evacuating Equipment:** Saliva ejectors are used to prevent pooling of saliva at the floor of the mouth. High volume evacuating equipment removes solid debris along with water.<sup>1,2</sup>

1. **Metallic**-have rubber dip to avoid irritating the delicate tissues on the floor of the mouth and these are autoclavable.
2. **Plastic**-are inexpensive and disposable.

**Requirements:** To face backward the tip should always be molded with a slight upward curvature. To prevent injury to soft tissue the floor of the mouth under the tip should be covered with gauze. The lip or cheek mucosa should not get traumatized. Instrumentation should not have interfered. It should be used with other adjuncts e.g. cotton rolls, gauze.<sup>1-3</sup>

**Advantages:**

(1) Adequate dry field along with the advantage of washed field. (2) No dehydration of oral tissues.

**Precautions:** Care should be taken to avoid cross-contamination. After each use, the saliva ejector should be disinfected. Disposable tips are preferred. The child should not close his mouth to hold the tip since it may cause backflow of contaminated solution into his mouth as a result of pressure changes.

**C. Rubber Dam:** This is usually latex rubber and one of the most effective means of isolating teeth. It was developed by BARNUM (1864).

**Rationale:** (1) The clean and visible field is maintained. (2) Aspiration of foreign bodies is prevented. (3) Clinician protection. (4) The risk of cross-infection to the root canal system is reduced. (5) Soft tissues are retracted and protected. (6) By minimizing patient conversation and the need for frequent rinsing efficacy is increased. (7) Medicaments are applied without the fear of dilution. (8) Properties of restorative materials are improved.<sup>3</sup>

The patient gets a psychological benefit.

**Contraindication 3:**

- (1) A child with Upper respiratory tract

disorder, Congestion of nasal passage or nasal obstruction. (2) If there is any fixed orthodontic appliance. (3) Any recently erupted tooth that can not hold a clamp. (4) Allergy to latex.

**Disadvantages 7:** (1) Trauma to tissue. (2) Patient acceptance. (3) Latex allergy. (4) Trauma to tissues. (5) Pressure marks on face due to frame. (6) The build-up of saliva. (7) Psychological intolerance

**Benefits to the Child:** As glasses are used to protect the eyes, thus rubber dam is used to protect the airways and the esophagus. By doing this a good analgesia has been obtained, the child can feel distanced from the operation. Sometimes it is useful to show the child his isolated tooth in the mirror.<sup>4</sup>

**Benefits to the Dentist:** This reduces the effort required by the operator to protect the soft tissues of the mouth and the airways. Correctly placed rubber dam allows the operator a better view of the area to be treated by gently pulling the cheeks and tongue away from the operative area. Rubber dam gently pulls the gingival tissues away from the cervical margin; makes it easier to see the extent of any caries close to the margin.

**Precautions:** (1) The patient should not breathe through the mouth. (2) To retrieve the clamp if ingested or aspirated, clamps must be tied to a floss thread and tightly secured in place. (3) The dam should not cover nostrils. (4) To prevent drying of lips, these should be lubricated properly. (5) The clamp should neither impinge on the gingival tissue nor traumatize the nearby teeth. (6) Latex-free rubber dam should be used on patients with allergy to latex. Rubber dam napkin is used to prevent the latex rubber dam from contacting the patient's tissues.<sup>5</sup>

**Armamentarium:** I. Rubber dam sheet II. Rubber dam frame III. Rubber dam punch IV. Rubber dam forceps V. Waxed dental floss VI. Scissors VII. Rubber dam napkin VIII. Lubricants IX. Clamp

**Euphemisms Used for the Armamentariums:** Rubber dam sheet–Raincoat, Frame–Hanger, Clamp–Clip

**Rubber Dam Sheet:** Rubber dam is available in different thicknesses.

Thin -0.15mm

Medium – 0.20mm

Heavy – 0.25mm

Extra-heavy – 0.30mm

Special heavy – 0.35mm

It is available in prefabricated sizes, i.e. 5"X5" or 6"X6", while non-latex rubber dam is of only 6"X6" size. This has two surfaces which are shiny and dull. As it is less reflective, the dull surface is kept facing occlusally.

**Rubber Dam Frame:** There are two types of frames i.e. metal frame and plastic frame. The young frame is a metal frame whereas Star visiframe, Nygard-Ostby, Quick dam or Handidam frames are plastic frames. Starlite visiframe, a U-shaped frame, exerts less force on the dam and is easier to use. Nygard Ost by frame does not require any absorbent napkin and stands away from the face. A quick dam comes with a flexible attached frame, which is effective for the control of saliva in the anterior part of the mouth than the posterior part. Handidam has a built-in frame with a rod for insertion to keep the dam open and it comes in one size. Drydam does not require a frame.<sup>6</sup>

**Rubber Dam Punch:** It is used to punch holes corresponding to teeth size on the rubber dam sheet.

**Lubricants:** For easier placement of the dam, lubricants are applied in the area of punched holes, which should be water-soluble e.g. shaving cream and soap slurry.

**Clamps:** These are made up of stainless steel, consisting of a bow and two jaws. They are used to aid anchoring the dam to the tooth and soft tissue retraction.

**Rubber Dam Clamps Used in Pediatric Use:** Partially erupted permanent molar- 154A, 8A Ivory, Fully erupted permanent molar-14, 8 Ivory, Primary second molar-26, 27, SS White, 3 Ivory, Primary first molar, bicuspid, permanent canine-2, 2 A Ivory, Primary incisors and canine-0 Ivory.<sup>7</sup>

**Procedure of Rubber Dam Placement:** As with any other dental procedure, the preparation of the child for rubber dam application should be done. In a situation where the clamp might impinge on the gingival, local anesthesia should be obtained. The clamp should be secured with floss for easier in quick retrieval; if the clamp is dislodged accidentally. Clamp should be placed using rubber dam forceps on the tooth. Using the rubber dam punch and template punching of an appropriate

hole on the sheet should be done. The sheet is stretched with the hole over the clamp lingually, distally and buccally below the jaws of the clamp. The sheet is passed through a rubber dam napkin so that the latex sheet does not come in direct contact with the skin. To prevent bunching of the sheet, stretching and securing the sheet over the rubber dam frame should be done. Where necessary, there ligation of teeth with dental floss and placement of wedges for additional retention should be done. The dam around the tooth should be inverted using a blunt instrument or compressed air from the air syringe. Then, the planned dental procedure can be carried out. Removal of the rubber dam is done by cutting ligature, removing used wedges, cutting interdental material with scissors and removing the rubber dam frame, dam sheet, and clamp.<sup>8</sup>

It is not appropriate to include more teeth in the rubber dam than necessary to get adequate working space. If the first or second permanent molar is the single tooth in the quadrant which is carious in an occlusal area it is often referred to as punch only one hole in the dam.

For single tooth class I or V restorations, only one the carious tooth must be isolated. To restore proximal lesions, at least one tooth before and one tooth after to the tooth being restored should be isolated. It helps in better access, gives more convenient ways to place a matrix and proper field of visualization of where can be done appropriate carving of the restoration along the side of marginal ridges. This procedure requires only seconds and can save many times.<sup>9</sup>

**Recent Advances Inrubber Dam Isolation:** Hatdam is a clear plastic form shaped like a hat without a top which is trimmed and fitted around the crown that can not be clamped, to hold the rubber dam in place. Cushioning metal clamp jaw is made up of Ferrite-N which can be pressed in the embrasure area. The material is light-cured, over which the clamp is seated. Cushees are soft thermoplastic cashew-shape nodules which are slipped over tooth attachment blade of the clamp before clamp application. Fiber optic clamps are used in the endo illuminator system. Liquid dam is a resinous material applied to the gingival aspect of the tooth surface used to blockout undercuts before take impression.

**Drugs:** Antisialagogues can be used to decrease excess salivation e.g. Atropine. Local anesthesia, in addition to the vasoconstrictor in it, brings about a reduction in pain and salivation.

**Children's Reaction Towards Isolation:** Several studies have been investigated the physiological and psychological responses of children during the dental procedure and their behavior may vary with the type of dental procedure, the number of visits and during the procedure of visit itself. From a previous traumatic experience, originated anxiety and fear or due to general health problems, it might exhibit an emotional upset for most of the children<sup>11</sup>. Children's anxiety and fear of dentistry should be reduced as much as possible before dental treatment<sup>12</sup>. Compared to cotton rolls isolation, rubber dam causes less anxiety in children and adolescents. Most of the children overrule cotton rolls as they think that it may not be as effective as saliva ejector in isolation. In a rubber dam, isolation children feel that the treatment is taking place outside of their mouth. Sometimes, most of the children prefer saliva ejector, as saliva ejector takes away all the saliva, making the operative field clear along with the feeling of control over situation. This happens due to the use of inductive logic i.e. making broad generalization from specific observations by the children of this age group.<sup>10</sup>

### Conclusion

From all of the above isolating techniques, rubber dam is the most convenient one. Studies have shown that there are successful retention rates of adhesive restoration when a rubber dam is used rather than any other isolation technique. The judicious use of rubber dam ensures greater patient comfort and delivery of high-quality dental care to pediatric patients. Recently, pre-framed rubber dam sheets have been introduced in which, individual rubber dam sheets are attached to modified frames. They are easy to use as the rubber dam and holder are applied as a single unit. They are comfortable for the patient and is easily accepted by patients. These are easily removable. This takes less time to operate.

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