REVIEW

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Isolation Techniques in Pediatric Dentistry and Recent Studies on the Topic

Çocuk Diş Hekimliği'nde İzolasyon Yöntemleri ve Konu Üzerine Yapılan Güncel Çalışmalar

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ABSTRACT

Pediatric dentistry involves a wide range of restorative, endodontic, surgical, and preventive treatments aimed at maintaining the oral health of individuals aged 0–15 years. The long-term success of these procedures is strongly associated with maintaining a dry, clean, and uncontaminated working field during dental interventions. For this reason, the choice of isolation technique plays a critical role in achieving optimal clinical outcomes. The effectiveness and patient compatibility of the selected isolation method directly influence the success of the treatment, especially in pediatric patients who often present unique challenges in terms of both anatomy and behavior. This narrative review focuses on evaluating commonly used traditional methods such as cotton rolls, saliva ejectors, and rubber dams, as well as modern isolation systems like Isolite and DryShield. These newer systems combine suction, lighting, and bite block functions, offering a more integrated and efficient approach. They have been shown to significantly improve clinical workflow and enhance the comfort and cooperation of pediatric patients during treatment. Furthermore, behavioral traits like short attention span, increased salivation, and limited mouth opening must be considered when selecting an isolation strategy. A personalized and patient-centered approach should be prioritized. Incorporating advanced systems can contribute to more effective, time-efficient, and stress-free pediatric dental procedures, ultimately leading to improved patient compliance and satisfaction.

Keywords: *Pediatric dentistry, Rubber dam, Saliva*

ÖZET

Pedodonti, 0–15 yaş arası bireylerin ağız ve diş sağlığını korumaya yönelik restoratif, endodontik, cerrahi ve koruyucu birçok tedaviyi kapsamaktadır. Bu tedavi işlemlerinin uzun vadeli başarısı, işlem sırasında kuru, temiz ve kontaminasyondan uzak bir çalışma alanının sağlanmasıyla doğrudan ilişkilidir. Bu nedenle, kullanılan izolasyon tekniğinin seçimi klinik başarı açısından kritik bir rol oynamaktadır. Özellikle pediatrik hastalarda seçilecek yöntemin etkinliği ve hastaya uygunluğu, tedavi sürecini doğrudan etkilemektedir. Bu anlatı derlemesi, pamuk rulolar, tükürük emiciler ve rubber dam gibi geleneksel izolasyon yöntemlerinin yanı sıra Isolite ve DryShield gibi modern sistemlerin etkinliğini değerlendirmektedir. Bu yeni nesil sistemler, entegre emme, aydınlatma ve ısırma desteği gibi fonksiyonları bir araya getirerek daha verimli ve entegre bir yaklaşım sunmaktadır. Klinik süreci hızlandırmakta, hasta konforunu artırmakta ve çocuk hastaların tedaviye uyumunu kolaylaştırmaktadır. Ayrıca, kısa dikkat süresi, artmış salivasyon ve sınırlı ağız açıklığı gibi çocuklara özgü davranışsal ve anatomik özellikler izolasyon tekniği seçiminde mutlaka dikkate alınmalıdır. Bireyselleştirilmiş ve hasta merkezli bir yaklaşım ön planda tutulmalıdır. Modern sistemlerin klinik uygulamalara entegrasyonu, pedodontik tedavilerin etkinliğini ve hasta memnuniyetini artırmada önemli katkılar sağlayabilir.

Anahtar Kelimeler: *Çocuk diş hekimliği, Rubber dam, Tükürük*

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1. Introduction

For restorative procedures to be successful, it is crucial to effectively manage moisture and microbial contamination in the treatment area.[1] Isolation techniques are employed to prevent the operative field from being exposed to saliva, bacteria, or blood. These methods help control challenges such as excessive salivation and frequent tongue movement, thereby reducing treatment time and minimizing the risk of foreign body aspiration. Additionally, isolation improves visibility for the clinician and enhances the performance of restorative materials by maintaining optimal working conditions.[1] The American Academy of Pediatric Dentistry highlights the importance of providing safe pediatric dental treatment and emphasizes that patient airway protection should be ensured through appropriate isolation techniques.[2]

2. Isolation Tecniques in Pediatric Dentistry

2.1. What is Isolation and Why is it Necessary?

In dentistry, isolation refers to the practice of maintaining the operative field clean and dry by protecting it from saliva, blood, and other oral fluids during treatment. Effective isolation significantly influences the success of dental procedures. Moisture control is especially critical for composite resin restorations, as proper bonding to dentin and enamel requires a dry surface. The presence of moisture can compromise bond strength and negatively affect the long-term durability of the restoration. Furthermore, in endodontic treatments, successful outcomes depend on keeping the root canal system dry and free from moisture, which is made possible through proper isolation techniques. Effective isolation also plays a crucial role in infection control. By preventing microbial contamination during dental procedures, it ensures a safer treatment environment for both the patient and the clinician. In summary, the proper and efficient application of isolation techniques in dentistry not only enhances the overall quality of treatment but also significantly reduces the risk of infection.[3-5]

2.2. Isolation Techniques

2.2.1. Cotton Rolls

Cotton rolls are among the fundamental isolation tools used to maintain a clean and dry operative field by protecting the working area from saliva, blood, and other oral fluids during dental procedures. These simple yet effective devices play a direct role in the success of restorative treatments.[3] By slightly retracting soft tissues, cotton rolls help enhance the clinician's visibility and improve patient comfort. When placed correctly, they contribute positively to the progression and outcome of the treatment. Selecting the appropriate size and quantity of cotton rolls not only increases patient comfort but also enables the dentist to perform with greater precision and control.[3]

Despite their usefulness, cotton rolls have certain limitations, particularly in achieving complete isolation and consistent moisture control. Unlike rubber dam systems, they are not capable of fully isolating the operative field from contaminants such as saliva and blood. Therefore, relying solely on cotton rolls in adhesive restorative procedures—which require strict isolation—may increase the risk of clinical failure. Additionally, since cotton rolls absorb intraoral fluids, they need to be replaced frequently throughout the procedure to maintain effectiveness.[3]

2.2.2. Saliva Ejectors

The primary function of saliva ejectors is to maintain a consistently dry working field by preventing the accumulation of oral fluids, thereby enhancing treatment efficiency and patient comfort. They are especially useful during restorative procedures, endodontic treatments, and surgical interventions, as they assist in removing saliva and blood from the oral cavity. Typically made of plastic and designed for single use, saliva ejectors operate at low suction pressure. Positioned on the floor of the mouth, they effectively remove fluids before accumulation occurs. By continuously evacuating moisture from the oral environment, saliva ejectors improve visibility for the clinician and support a more controlled and precise treatment process.[6]

Since saliva ejectors are connected to automated suction systems, they function without requiring active intervention from the clinician. However, in cases where saliva ejectors alone are insufficient, they may need to be combined

with high-volume evacuators or other isolation techniques. Proper positioning of the suction tip is crucial for both effectiveness and patient safety. Incorrect placement can cause discomfort by adhering to the mucosa or lead to fluid accumulation in the operative field due to inadequate suction. While saliva ejectors provide a convenient solution for short dental procedures, longer or more complex treatments often require supplementary isolation methods. Saliva ejectors designed to match the patient's oral anatomy enhance treatment outcomes and improve overall patient experience. Additionally, the tips attached to the ejectors should be made of non-irritating materials and shaped to prevent obstruction by soft tissues or intraoral debris.[7]

In surgical procedures, high-speed surgical suction systems are utilized. This is typically achieved using Fraser suction tips, which are available in various sizes and are essential components of surgical instrument sets. The hole located on the handle of the Fraser tip allows the operator to control the suction power. For maximum suction, the operator covers this hole with the thumb, enabling full vacuum strength. Conversely, when aspirating delicate soft tissues, the hole is left open to reduce the suction intensity. Additionally, it is recommended to have a Yankauer or tonsil suction tip available in the clinical setting. These tips are suitable for removing large volumes of tissue and debris. Their blunt-ended design allows for safe advancement toward the posterior oral cavity and pharynx, even without direct visual guidance.[8]

2.2.3 Retraction Cords

Retraction cords are commonly used in restorative and prosthodontic procedures to temporarily displace the gingival tissues, allowing better access and visibility of the cervical margins of the tooth. By gently pushing the gingiva away from the tooth surface, retraction cords help to create a dry, clear working area and prevent bleeding or fluid seepage during impression-taking or adhesive procedures. These cords are typically made from cotton or synthetic fibers and may be impregnated with hemostatic agents to control bleeding. Proper placement of retraction cords is crucial, as excessive pressure or incorrect technique may lead to tissue trauma or postoperative discomfort.[3] The size of the retraction cord selected should be appropriate to avoid causing trauma to the gingival tissues. Additionally, care must be taken to avoid applying excessive force during placement, as undue pressure can lead to gingival injury or postoperative discomfort.[3]

2.2.4 Rubber Dam

Rubber dam, made from either latex or latex-free materials, not only provide clinicians with a cleaner and more controlled operating field, but also protect patients from exposure to toxic substances and prevent inhalation of potentially harmful agents. By effectively isolating the treatment area, rubber dams reduce the spread of saliva, blood, and dental aerosols, thereby minimizing the risk of cross-contamination and infection for both the patient and the dental professional. Additionally, they help prevent the ingestion or aspiration of small instruments and restorative materials during treatment.[9,10]

Invented in 1864 by Dr. Sanford Barnum, the rubber dam initially consisted of a rubber sheet and a simple frame, and was used to isolate one or more teeth from contaminants such as saliva, blood, and harmful microorganisms within the oral cavity. By the late 19th century, its use had become widespread in endodontic and restorative dentistry. During the mid-20th century, advancements were made in the design of clamps and frames, leading to the development of more modern and efficient rubber dam systems.[11] By the mid-20th century, the development of composite resins and the need to perform procedures in dry, moisture-free environments made the use of rubber dams increasingly important. Today, organizations such as the American Association of Endodontists consider rubber dam application an essential component of endodontic treatment protocols.[12]

In pediatric patients, elevated salivary flow increases the risk of failure in adhesive restorations. The use of a rubber dam is therefore essential, as it helps maintain optimal bonding conditions by preventing contamination from saliva, blood, and other oral fluids, thereby enhancing the effectiveness of adhesive materials. In pediatric patients, the use of a rubber

dam aids in maintaining mouth opening during longer procedures and significantly reduces the risk of accidental ingestion of foreign materials. Since children often present challenges in terms of salivary and moisture control, rubber dam isolation becomes essential for achieving successful outcomes in both endodontic and restorative treatments.[13]

2.2.4.1.Components of the Rubber Dam System

2.2.4.1.1. Rubber Dam Sheet

They can be produced from either latex or latex-free materials and are available in various thicknesses.[7] Rubber dams are typically available in pre-cut, pre-shaped sheets measuring 150 mm square. Although less common, they are also sold in roll form. For pediatric patients, scented versions are available to minimize discomfort caused by unpleasant odors. In terms of thickness, rubber dams come in thin, medium, heavy, and extra heavy options. Medium thickness is generally recommended for endodontic procedures, as it provides a suitable balance between flexibility and tear resistance. Dark-colored sheets—such as green, black, or purple—enhance visual contrast, improve operator comfort, and help reduce eye strain. Most rubber dam sheets are designed with one glossy and one matte side; the matte side is typically positioned facing the clinician. To preserve their elasticity and durability, rubber dams should be stored in a cool and dry environment.[14]

2.2.4.1.2 Rubber Dam Punch and Forceps

The rubber dam punch is used to create holes in the dam sheet that correspond to the teeth in the operative field, allowing isolation of the targeted area. There are two main types of punches: single-hole punches and rotary disc punches. Single-hole punches typically produce holes with a standard diameter of 1.63 mm or 1.93 mm. Rotary models, such as the Ainsworth and Ivory punches, feature adjustable rotating plates that can produce holes ranging from 0.5 mm to 2.5 mm in diameter. Larger holes are often preferred for molar teeth or when using winged clamps. Rubber dam forceps are instruments designed to transport, place, and remove clamps onto the tooth. While various designs exist, some are specific to certain clamp systems. Commonly used models include the University of Washington/Stoke, Brewer (Ash), and Ivory (Heraeus Kulzer). In certain forceps models, overly retentive jaws may hinder clamp release; in such cases, the tips of the forceps can be modified to reduce grip strength and improve usability.[14]

2.2.4.1.3 Frames

The rubber dam frame functions to stretch the edges of the dam sheet, ensuring stability and enhancing visibility of the operative field. Frames are available in both metal and plastic versions. Plastic frames—such as the Starlight Visi-Frame and Nygaard-Ostby are often preferred due to their lighter weight and, in some cases, their radiolucent properties. This allows them to be used during radiographic procedures without the need for removal. Additionally, hinged or foldable frame designs, such as the Ash model, offer added convenience when radiographs are required during treatment.[14]

2.2.4.1.4 Clamps

The need to stabilize the rubber dam sheet securely on the tooth led to the inevitable use of clamps. First introduced by Samuel Stockton White in 1882, rubber dam clamps have since undergone significant advancements and have been adapted for safe and effective use in pediatric patients.[14]

Clamps are specifically designed for different groups of teeth, and proper clamp selection depends on both the type of tooth being treated and its anatomical characteristics. It is essential to choose a clamp that fits the tooth morphology accurately while minimizing trauma to the surrounding soft tissues. Once placed, the clamp must be fully stabilized and should not exhibit any mobility. An appropriate clamp should provide four-point contact around the cervical region of the tooth to ensure secure retention.[14] Over time, clinicians often develop personal preferences for specific rubber dam clamps based on the region of the mouth requiring isolation. However, if the clamp is not properly secured to the tooth, the tension from the stretched dam sheet may easily dislodge it. Therefore, it is recommended to trial-fit the clamp on the

tooth before rubber dam application to ensure its stability. As an additional safety precaution, approximately 45 cm of dental floss should be tightly tied to the clamp; this allows for easy retrieval in case the clamp becomes dislodged and poses a risk of aspiration into the pharynx. In clinical practice, the clamp is typically placed over the dam and delivered to the tooth using rubber dam forceps. Any excess dam material protruding from the clamp can be gently tucked away with a plastic instrument or explorer to achieve full marginal adaptation. If necessary, light finger pressure can be applied to seat the clamp more securely in the cervical direction.[8]
It is recommended to limit the number of isolated teeth to only those necessary for the operative field. For instance, if the first or second molar has a carious lesion limited to the occlusal surface, isolating only that tooth with a single hole punched in the rubber dam may be sufficient. This approach can be applied within seconds and contributes to a more time-efficient procedure overall.[8]

There are more than 50 different clamp designs available. These clamps may be identified by numerical, alphabetical, or color-coded systems, such as the Hygenic Fiesta system. Each clamp consists of two jaws connected by a bow. In some models, the jaws are asymmetrical and serrated, enhancing their grip on the tooth surface. Most clamps are made of stainless steel; however, variants manufactured from coated steel or plastic (e.g., SoftClamp) are also available. Coated steel clamps may be more susceptible to corrosion, particularly when exposed to agents like sodium hypochlorite. Plastic clamps, on the other hand, are radiolucent and are preferred in certain clinical situations where radiographic imaging is required.[14]

2.2.5 InstiDam

InstiDam **(**Zirc Dental Products, Minnesota, USA) is a single-use rubber dam system made from semi-transparent natural latex, designed to provide fast and easy isolation. It comes with an integrated, flexible, radiolucent nylon frame and features a pre-punched hole, which minimizes the risk of tearing. The hole is positioned half an inch off-center to facilitate easier placement. Thanks to its bendable structure, radiographs can be taken without removing the dam. As it does not require sterilization, InstiDam offers time and procedural efficiency in clinical settings.[15]

2.2.6 HandiDam

HandiDam (Aseptico Inc., Washington, USA) offers a more practical alternative to traditional rubber dam systems. It is pre-assembled with an integrated frame, eliminating the need for a separate external frame. This design allows for a quicker and simpler placement process. HandiDam provides effective access during endodontic procedures, saving time for the clinician while also enhancing patient comfort.[16]

2.2.7 OptraDam

Developed by Ivoclar Vivadent in 2005, OptraDam (Ivoclar AG, Schaan, Liechtenstein) is a modern isolation system that does not require the use of a frame or clamp (Figure 1).[17] Thanks to its anatomical shape, flexible inner ring, and soft material, OptraDam functions both as a lip and cheek retractor and as a full isolation system. It adapts to the patient's jaw movements, offering a comfortable experience during treatment. By providing a broader working field, it allows for simultaneous isolation of both the maxillary and mandibular arches. Additionally, due to its structural properties, it can be used during radiographic procedures without needing to be removed.[18]

Figure 1. OptraDam

2.2.8 Liquid Dam

Liquid dam materials such as HySolate Liquid Dam (Coltène/Whaledent, Altstätten, Switzerland) are resin-based barrier material primarily used in procedures requiring intraoral protection, such as tooth whitening. Applied directly to the gingiva, this liquid material retains its flexibility after curing, providing effective protection. It does not generate heat during application and poses no risk to sensitive tissues in the treated area. As a localized protective solution, it serves as an alternative to conventional rubber dam systems.[17]

2.2.9 MiniDam

MiniDam (VOCO GmbH, Cuxhaven, Germany) is a latex-free isolation system designed for use primarily in procedures involving proximal surfaces, offering a comfortable experience for the patient. Its design forms a protective barrier that prevents acidic chemicals from coming into contact with the gingiva. MiniDam does not require a clamp; the pre-punched silicone material can be easily stretched over the teeth. However, its use is limited to proximal and resin-based procedures. Studies have shown that pediatric patients report less discomfort

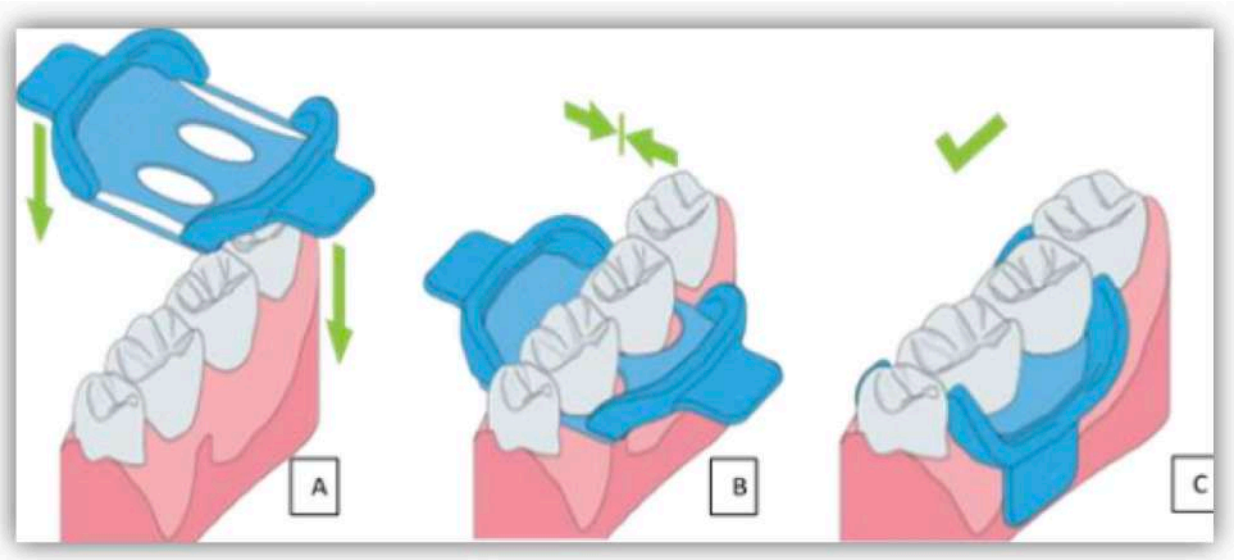

Figure 2. MiniDam

2.2.10 OptiDam

OptiDam (Kerr Corporation, Orange, CA, USA) is an isolation system distinguished by its three-dimensional (3D) anatomical shape and contoured design (Figure 3).[17] This structure conforms to the intraoral anatomy, improving access and visibility within the operative field. The system is available in models specifically designed for anterior and posterior regions. It allows patients to breathe comfortably without applying pressure to the nasal area. Clamp tension is minimized, making placement easier and reducing preparation time. Additionally, OptiDam is latex-free, powder-free, and autoclavable at 134 °C for 3 minutes.[15] During application, the nipple-like projections on the

rubber dam are first trimmed according to the position of the target tooth. The clamp is then placed on the corresponding tooth in a single step. Following this, the rubber dam material is positioned behind the wings of the clamp. In the final step, the dam is carefully stretched over the intended posterior teeth and secured in place.[17]

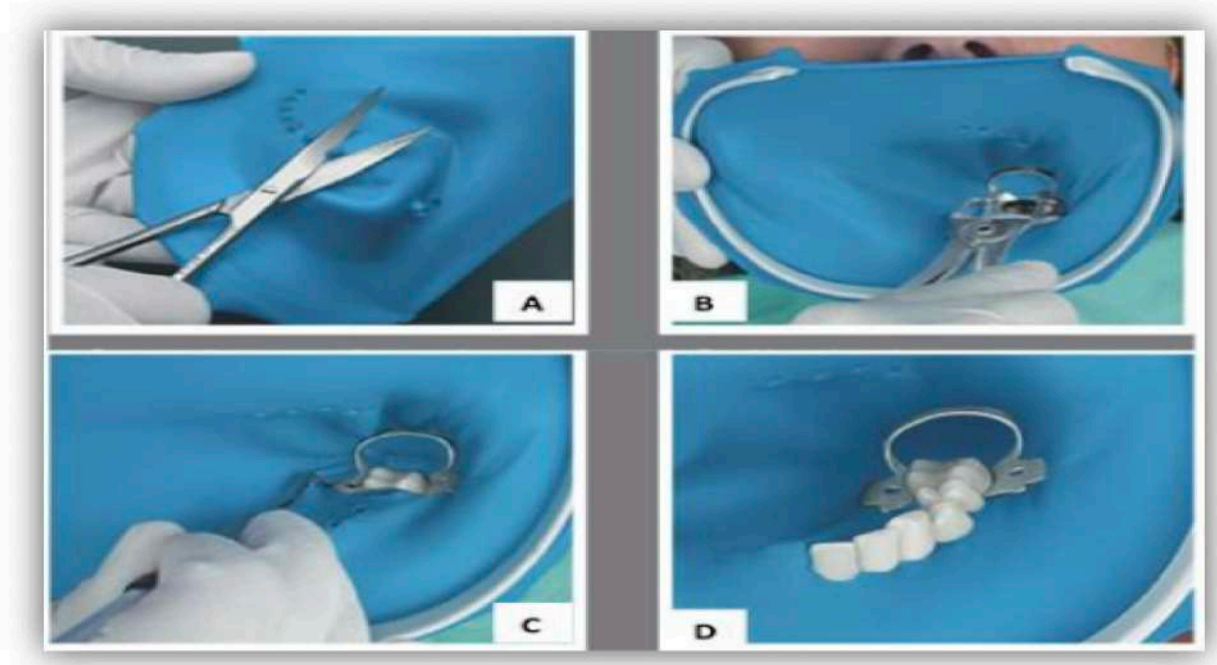

Figure 3. OptiDam

2.2.11. Framed Flexi Dam

Framed Flexi Dam (Coltène/Whaledent, Altstätten, Switzerland), is a latex-free isolation system with an integrated frame (Figure 4).[17] It provides a working area of 100 mm x 105 mm and features a soft frame that enhances patient comfort, along with a tear-resistant material for improved durability. The system is odor-free and extremely easy to place. Due to its non-irritating nature when in contact with the skin, it is also suitable for use in pediatric patients.[17]

Figure 4. Framed Flexi Dam

2.2.12 Dry Dam

The Dry Dam system (Directa AB, Stockholm County, Sweden) is an innovative solution designed to provide isolation without the need for a frame. It features a central rubber section surrounded by absorbent paper and is secured in place using elastic bands that wrap around the ears. Resembling a face mask in structure, it is particularly suitable for isolating anterior teeth. Its absorbent properties help control intraoral moisture; however, due to this characteristic, it is not recommended for use during whitening procedures (Figure 5).[16]

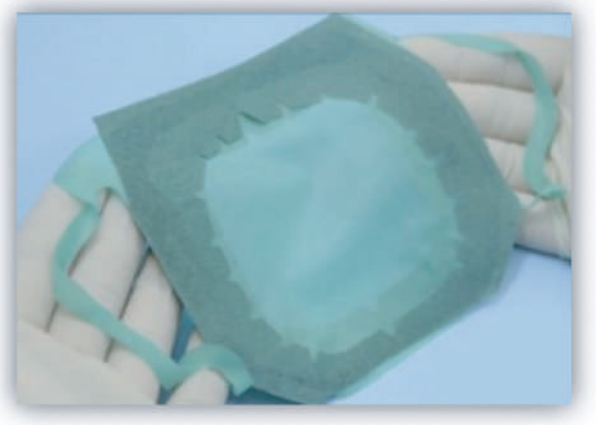

Figure 5: Dry Dam

2.2.13 Isolite and DryShield Systems

The Isolite (ISI) (Zyris Inc., Marietta, GA, USA) and DryShield Systems (DryShield LLC, Auburn, WA, USA) are multifunctional isolation solutions commonly used in modern dentistry. These integrated intraoral devices combine high-volume suction, a bite block, protective barriers for the tongue and cheeks, illumination, and soft tissue retraction into a single unit. They offer significant advantages in pediatric patients, particularly in cases where partially erupted teeth make traditional rubber dam clamp placement difficult. The Isolite system includes intraoral components made of soft, flexible polymer material that conforms to the oral anatomy, helping to prevent soft tissue injury. Additionally, it enables simultaneous treatment of both maxillary and mandibular quadrants (Figure 6).[15, 19] DryShield is a system with features similar to Isolite, but it differs in that some of its components are autoclavable and reusable, whereas the Isolite system is primarily single-use. Both systems are notable for their ability to reduce treatment time, enhance patient comfort, and optimize clinical efficiency. Integration into the dental unit requires specific adapters tailored to each system.[15, 19]

Figure 6. The Isolite system

4. Recent Studies Related to The Topic

In a systematic review and meta-analysis conducted by Shukla et al.[20] in 2024, the effectiveness of cotton rolls and rubber dam isolation techniques in fissure sealant application was compared. Following a comprehensive search in accordance with PRISMA guidelines, a total of 1,361 articles were screened. Of these, seven were randomized controlled trials (RCTs) and one was a non-randomized study, resulting in the inclusion of eight studies in total. The findings revealed that there was no statistically significant difference in the retention rates of fissure sealants between rubber dam and cotton roll isolation techniques during the first 6 months. However, by the 12-month follow-up, a statistically significant difference was observed, favoring rubber dam use. Sealants placed under rubber dam isolation demonstrated higher retention rates compared to those placed using cotton rolls. In terms of marginal integrity, no significant differences were found between the two isolation methods at either 6 or 12 months. In another study published in 2024 by Sharma et al.[21], fissure sealants were applied to the mandibular permanent molars of 30 patients aged between 7 and 10 years. The study followed a split-mouth design, with a total of 60 sites divided into two groups for comparison. In the control group, fissure sealants were applied to the lower right first permanent molars using cotton rolls and saliva ejectors for isolation. In contrast, in the experimental group, the same procedure was

performed on the contralateral left molars under rubber dam isolation. Additionally, physiological stress indicators such as pulse rate, systolic and diastolic blood pressure, and respiratory rate were evaluated. The results indicated that the use of a rubber dam was associated with a reduction in these stress-related parameters, suggesting that rubber dam isolation may contribute to decreased patient anxiety during dental procedures. In a study conducted by Saha et al.[22] in 2016, a survey was administered to 360 patients aged between 2 and 16 years who had no prior dental treatment experience. The participants were divided into three groups based on age: Group 1 (2–7 years), Group 2 (8–11 years), and Group 3 (12 years and older). Each participant watched three instructional videos demonstrating cotton roll, saliva ejector, and rubber dam isolation techniques, after which they completed a questionnaire evaluating their preferences. The results showed that across all age groups, the most preferred method was the saliva ejector, followed by the cotton roll, and lastly the rubber dam. Interestingly, while the youngest group (2–7 years) showed a preference for the rubber dam, the older groups favored the saliva ejector. The authors suggested that this outcome could be attributed to the development of logical thinking skills, which typically begin to emerge after the age of seven, influencing perception and preference.

In a clinical study, 52 children aged between 9 and 12 years were randomly divided into two groups to compare rubber dam and MiniDam isolation techniques during the application of pit and fissure sealants. The participants' anxiety levels were evaluated using the modified Venham scale and heart rate, while pain intensity was assessed via the Memojis Pain Scale. Data were analyzed using SPSS software. Statistically significant differences were observed between the two groups in terms of heart rate, pain, and anxiety levels both before and after the procedure ($p< 0.05$). It was concluded that the MiniDam technique offers an effective alternative for pit and fissure sealant procedures due to its ease of application, shorter clinical time, and positive impact on behavior management in pediatric patients.[23]

In a 2023 study conducted by Bagher and Sabbagh,[24] the clinical effectiveness, patient satisfaction, and future preference rates of the Isolite and DryShield systems were evaluated. According to findings from five clinical studies included in the review, both systems demonstrated shorter procedure times and higher patient satisfaction compared to traditional isolation methods such as the rubber dam and cotton roll. Notably, the Isolite system was reported to cause.

In a study conducted by Lyman et al.[25] in 2013, the retention of fissure sealants was evaluated using two different isolation techniques: cotton rolls and the Isolite System (ISI). The study included 29 patients with a mean age of 9.8 years. Fissure sealants were applied to the opposing first and second permanent molars within the same arch—one side using cotton rolls and the other side using ISI—in a split-mouth design. The results indicated no statistically significant difference in sealant retention between the ISI and cotton roll isolation methods. Additionally, it was observed that the maxillary arch exhibited lower retention rates compared to the mandibular arch.[25] In a study conducted by Collette et al.[26] in 2010, the time required to apply the Isolite System (ISI) was reported to be 5.7 minutes. In contrast, a previous study by Alhareky et al.[27] in 2014 found the application time to be approximately 10 minutes. More recent studies by Bagher et al.[28] (2021) and Mattar et al.[29] (2021) reported shorter durations of 3.6 and 4.1 minutes, respectively. These variations in reported application times are attributed to differences in the timing criteria and measurement methods used across the studies.

In a systematic review and randomized controlled trial conducted in 2025 to evaluate the effectiveness of the Isolite System (ISI) and its impact on patient comfort, five randomized controlled trials were identified through searches in Scopus, Embase, Medline, and Web of Science databases. Data from a total of 170 patients were analyzed. The majority of included studies reported that the Isolite System was as effective as cotton rolls and rubber dam in terms of moisture control and isolation, while also contributing

to a reduction in overall clinical procedure time. Furthermore, patient-reported outcomes indicated that the Isolite System was associated with less gag reflex and a reduced perception of taste, suggesting improved comfort compared to traditional isolation methods. However, due to the high risk of bias in the included studies and the relatively small sample sizes, the overall level of evidence was considered low.[30]

In a study conducted by Mahima et al.[31] in 2023, the effects of Optradam and rubber dam isolation techniques on dental anxiety in children were investigated. A total of 27 patients aged between 6 and 12 years were divided into two groups. In the first group, the rubber dam procedure was explained to the children using audiovisual materials (via video), after which the rubber dam was applied to a lower molar. In the second group, the Optradam system was similarly introduced through video explanation, followed by clinical application. After a 7-day washout period, the groups switched isolation techniques and the same procedures were repeated. Anxiety levels were assessed using the Venham Anxiety Scale. The results showed that anxiety scores associated with the Optradam technique were significantly lower than those recorded for the rubber dam, indicating a statistically significant difference in favor of Optradam in terms of reducing dental anxiety.

5. Conclusion

One of the most critical determinants of treatment success in pediatric dentistry is the proper selection and effective implementation of isolation techniques. Pediatric-specific factors such as increased salivary flow, limited oral opening, developing tooth morphology, and variability in patient cooperation necessitate the use of isolation systems that not only provide mechanical protection but also adapt to the individual's anatomical and behavioral characteristics.

Studies in the literature have shown that traditional methods such as cotton rolls and saliva ejectors offer advantages in terms of ease of use and speed. However, they may fall short in controlling contamination and ensuring the long-term success of restorative materials. While rubber dam provides superior isolation, it may negatively affect patient comfort in certain age groups. Interestingly, children under the age of seven have shown greater acceptance of rubber dam, possibly due to their underdeveloped logical reasoning skills. Modern systems like Isolite and DryShield, with their integrated illumination and suction capabilities, reduce treatment time, improve patient comfort, and minimize gag reflex, particularly in pediatric patients. Studies have demonstrated that these systems offer significant advantages in terms of stress reduction, anxiety control, treatment efficiency, and clinical success. However, given the limited sample sizes and high risk of bias reported in current systematic reviews, these findings should be interpreted with caution. In conclusion, the selection of isolation technique should be individualized, taking into account patient age, cooperation level, procedure duration, and comfort. Next-generation isolation systems represent a promising alternative in pediatric dental practice, offering both clinical effectiveness and improved patient satisfaction.

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Since our article is a review, ethics committee approval was not required.

Conflicts of interest
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