

Improving patient care: alternative rubber dam isolation methods

Melhorando o cuidado ao paciente: métodos alternativos de isolamento absoluto

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ABSTRACT

Adhesive techniques are more sensitive than conventional techniques and it is mandatory to isolate the operatory field. To accomplish this goal, rubber dam isolation is the gold standard procedure. In root canal treatment, use of a rubber dam is found to be the standard of care, however, it is usually abandoned by professionals as time progresses from graduation to professional life, since the prevalence of rubber dam use is found to be low in many studies. To increase the use of rubber dams, adaptations of traditional techniques have been suggested. One possible way of reducing gingival trauma and pain promoted by isolation clamps during rubber dam usage would be the application of a thin layer of a soft material between the clamp and the tooth/gingival tissue. Objective: The purpose of the present work is to present

alternative methods of rubber dam isolation, thus improving patient care. Description: Two methods are described: 1- Dam Coverage Method- Clamping the rubber dam over the tooth (putting the clamp over the dam and the teeth at the same time, without including the clamped tooth in the operatory field); 2- Silicone Coverage Method: Inter positioning of a heavy (high viscosity) silicone impression material between the tooth and the clamp. Conclusions: The current authors purposed two simple methods for absolute operatory field isolation using a rubber dam. These methods reduce sensitivity, provide little or no gingival trauma and better comfort to the patient during rubber dam isolation as well as in the postoperative period, thus improving patient care.

KEYWORDS: Rubber Dams; Standard of Care; Gingiva; Wounds and Injuries; Pain; Prevention and Control.

INTRODUCTION

Adhesive dentistry has changed the daily work routine of dentists, since it has provided many benefits for both patients and professionals. The aesthetics and economics of healthy teeth seem to be the most remarkable advantages reached with those techniques. However, these advances come with an increasing challenge for dentists, as adhesive techniques are more sensitive than conventional techniques.

When using adhesive techniques, e.g., restoring a tooth with composite plus denting bonding systems or setting a ceramic/composite partial/total crown using resinous cements plus adhesives, it is imperative to consider contamination by saliva, blood or any humidity that can come from the oral environment, due to the sensitivity of these procedures¹⁻⁴. It is mandatory to isolate the operatory field, especially when working on the posterior dentition. To accomplish this goal, rubber dam isolation is the gold standard procedure.

Rubber dams have been used in dentistry since 1864⁵. Many advantages are attributed to this technique: 1- Protection of the patient's oropharynx, preventing the ingestion or aspiration of instruments /materials/irrigants, which in turns protects the operator from possible future legal responsibility; 2 - Soft tissue retraction (gingiva, tongue, lips and cheeks), thus providing: A-protection of these tissues from injuries generated by operatory

procedures/ B - improved access to the operatory field; 3 -improvement in visibility by lack of mirror fogging and improved visual contrast due to a dry operating field; 4 -increased ease of four-handed dentistry; 5 - minimizing the ability of the patient to hold a conversation as well keeping their mouth open during treatment, thus reducing the time spent during treatment; 6 - controlling cross-infection and preventing contaminated aerosols; 7 - reducing contamination of the operating field⁵⁻⁸. In root canal treatment, use of a rubber dam is found to be the standard of care, as it is integral and essential for any nonsurgical endodontic treatment⁹.

Although rubber dam use presents many advantages, it is usually abandoned by professionals as time progresses from graduation to professional life. The prevalence of rubber dam use is found to be low in many studies¹⁰⁻¹³. The main reasons given by professionals for not using rubber dams are: high cost, time consuming, inadequate training, difficulty in use, lack of patient acceptance, low treatment fees and lack of patient cooperation^{5,7,10,12}. However, some authors have stated that these reasons are nothing but a myth⁵⁻⁷.

To improve the acceptance of regular rubber dam use by dentists, the current authors have indicated a new approach in teaching strategies during dental school to reduce the discrepancy between what is taught and the general practice of dentistry¹⁴.

Ahmad⁵ has also advocated that rubber dams will be frequently used only if dentists use it during their daily dental practice. The regular use of rubber dams gives the required abilities for professionals to use it more easily and regularly, with less time to apply the technique and less discomfort to the patients.

To increase the use of rubber dams, adaptations of traditional techniques have been suggested. Owens¹⁵ has proposed an alternative rubber dam isolation technique for the restoration of class V cervical lesions which consists of punching several overlapping holes in the dam, for easy application, and a modification of the #212 clamps for adequate retraction of the facial gingival tissues. Chan e Kious¹⁶ have proposed a simple method for preventing hypersensitivity in contra-lateral teeth during restorative procedures. This method involves covering the exposed teeth with finger cots or custom-made glove cutouts. Those authors demonstrated that this method was very effective in controlling contra-lateral tooth hypersensitivity without the need of bilateral anesthesia of the patient. Although this method seems to be easy and simple to use, the materials suggested are not always part of a dentist's daily practice arsenal. It is possible that rubber dams could be employed more frequently if new techniques or methods which consider existing instruments/materials were employed, thus improving patient care. Moreover, techniques that avoid gingival injury during clamping should be proposed. Gallego *et al.*¹⁷ has found a positive relationship between bisphosphonate-related osteonecrosis of the jaw (BRONJ) with the gingival trauma generated by clamping during root canal treatment.

One possible way of reducing gingival trauma and pain promoted by isolation clamps during rubber dam usage would be the application of a thin layer of a soft material between the clamp and the tooth/gingival tissue. Presumably, this material could act like a cushion, minimizing the action of the clamp over the tooth or the gingival area. This material can also avoid the contact of an eventually exposed root to cold water, irrigants or other substances that can lead to tooth hypersensitivity. Conceição e Soares¹⁸ put the rubber embolus of an anesthesia tub over the lingual jaw of a #212 clamp, promoting tissue retraction only on the facial side, which was the region of interest. Similar techniques or methods should be used to improve patient care.

PURPOSE

The purpose of the present work is to present alternative methods of rubber dam isolation, thus improving patient care. Two methods are described:

Dam Coverage Method: Clamping the rubber dam over the tooth (putting the clamp over the dam and the teeth at the same time, without including the clamped tooth in the operatory field);

Silicone Coverage Method: Inter positioning of a heavy (high viscosity) silicone impression material between the tooth and the clamp.

These two methods are based on the rationale that the interposition of a thin layer of rubber (the rubber dam itself or an impression material) between the clamp and the tooth can reduce both patient discomfort and gingival trauma, while also

preventing tooth hypersensitivity.

DESCRIPTION OF TECHNIQUES

Dam Coverage Method - Clamping rubber dam over the tooth

This method has already been presented in the literature. However, it was not described as a method itself but more like an adjunctive procedure for specific clinical situations¹⁹. The purpose of the current description is to turn it into a method which can be used in most clinical situations.

When anterior teeth are restored, a field that includes premolar to premolar, or at least canine to canine, teeth offers a wide working area with good visibility and adequate space to facilitate liquid evacuation by suction. However, if a central incisor is to be treated, for example, only the area related to this tooth is regularly under anesthesia and premolar clamping can generate pain. Thus, the following is suggested:

The rubber dam is mounted on the frame;

Six or eight holes will be punched on the rubber dam, respectively, if isolation will be made from canine to canine or from first premolar to first premolar;

The rubber dam (Madeitex, São José dos Campos, SP, Brazil) mounted on the frame (Young's Metallic Frame, Golgran Ltda., São Caetano do Sul, SP, Brazil) is stretched over the teeth;

In the example of using 6 holes, two premolar clamps (#206 and #208, KSK, Dentech, Tokyo, Japan), one per side of the mouth, are put over the rubber dam using the clamp forceps (Palmer's Forceps, Golgran Ltda., São Caetano do Sul, SP, Brazil), without a hole in the dam that could include these first premolars in the operatory field. (Figure 1)



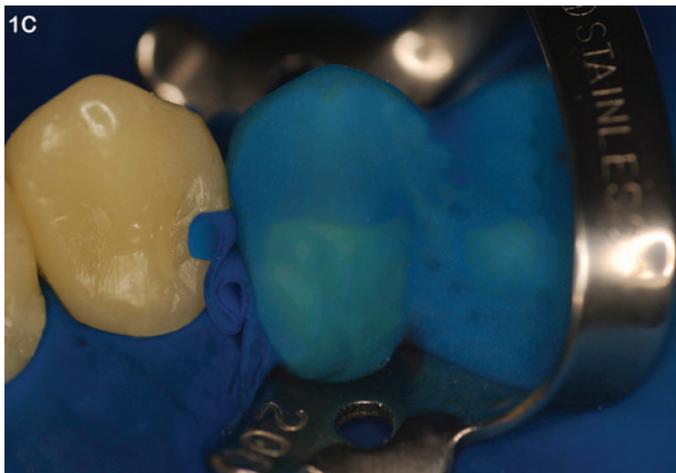


Figure 1. Dam Coverage Method: Rubber dam isolation with the clamp being put over the dam plus the tooth. A – In this case, the space between the central incisors (diastema) will be closed using composite resin. No dentinal tissue is exposed, thus anesthesia is not necessary. The central incisors, lateral incisors and canines were included in the operatory field. To avoid using anesthesia in the premolar areas, the two first superior premolars had #208 and #209 clamps (KSK, Dentech, Tokyo, Japan) put over each tooth with the dam in between them. B – Artificial tooth rubber dam isolation done with the same method described above. The #206 and #208 clamps (KSK, Dentech, Tokyo, Japan) were put over the dam/teeth; C- A close view of the clamp position over the tooth.

Silicone Coverage Method - Silicone impression material interposed between the tooth and the clamp

The application of this method is proper for any situation, including those where root canal treatment is done and where just one single tooth is isolated.

When considering a second molar that is to be restored, a field that includes at least one tooth behind and two teeth in front of the treated tooth is required. The clamp will be put over the third molar and thus, even though the patient is under anesthesia, the gingival tissue around this tooth can be injured by clamping; mainly if special clamps (#26 or #W8A) are employed. To avoid this, the following technique is described:

The rubber dam is mounted on the frame and holes are punched using the punching tool;

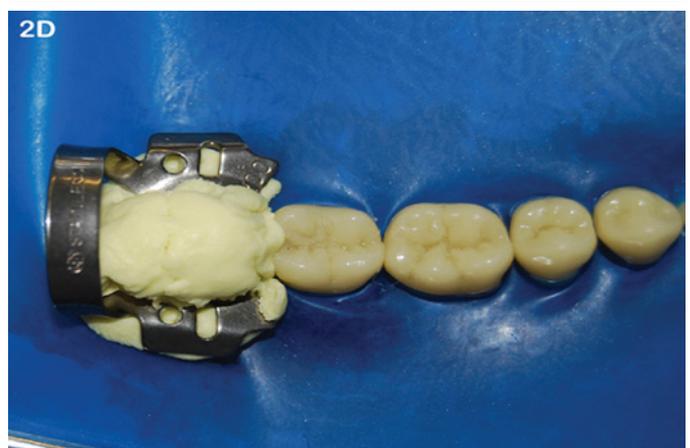
The rubber dam and frame is brought to the mouth and the holes on the rubber are stretched over each tooth, in this present case, from third molar to canine;

A small amount of high viscosity putty impression material (condensation cured) is placed (Optosil®/Xantopren® VL Plus, Heraeus Kulzer South America Ltda., São Paulo, SP, Brazil) according to the following steps. The putty is put over the tooth that will be clamped (third molar), with the rubber dam previously positioned in place. The clamp is put directly over the impression material and, after completion of the polymerization reaction; the excess silicone is removed using a Hollenbeck instrument (Golgran Ltda., São Caetano do Sul, SP, Brazil), leaving a thin layer of the material between the tooth and the clamp (Figure 2).

The two methods described above can also be used at the same time in the same operatory field (Figure 3).

Potential Problems

It can be challenging when the operator is not successful



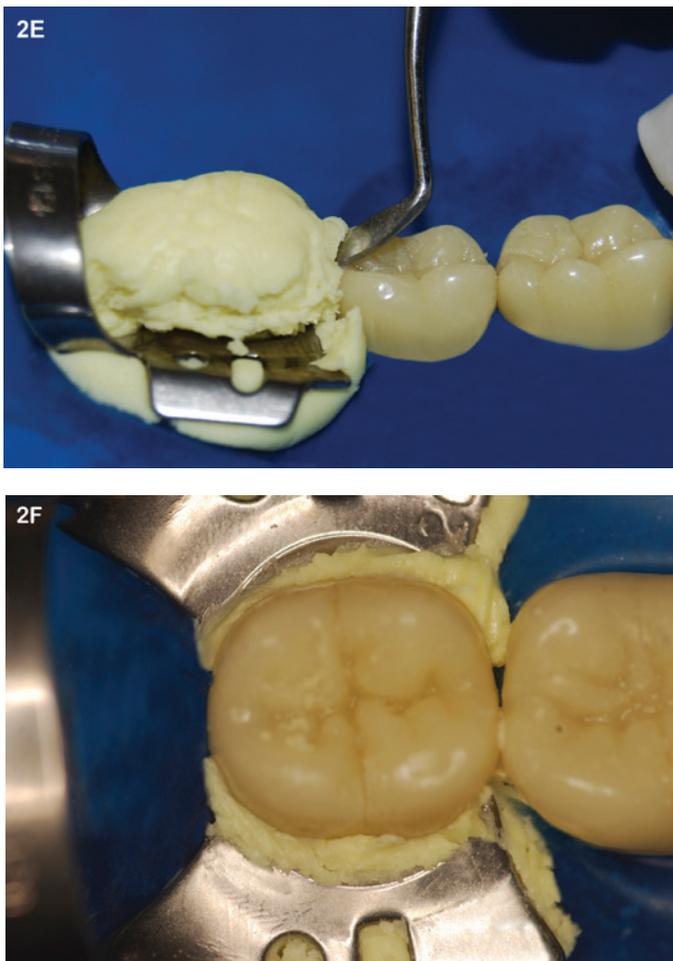


Figure 2. Silicone Coverage Method - Rubber dam isolation using the method that clamps an elastomeric impression material over the tooth. The method is showed using artificial teeth. A - The elastomeric material - heavy compound (Optosil® / Xantopren® VL Plus, Heraeus Kulzer South America Ltda., São Paulo, SP, Brazil) is in the operator hand in order to mix the base (yellow compound) and catalyst (red compound); B - The mixed material is put over the tooth that will be clamped. The rubber dam and the frame were already placed. C - The clamp is put over the impression material (thus over the tooth, but with the impression material in between); D - Clamp in position; E - The excess impression material is removed by the operator using a Hollenback instrument; F - A close view of the clamped tooth with a small strip of impression material between the #200 clamp and the tooth.



Figure 3. The two methods of rubber dam isolation can be used simultaneously. The inferior third molar is clamped using the silicone coverage method and the first inferior premolar in the opposite arch has the clamp over it with the dam between the tooth and the clamp (dam coverage method).

when clamping the tooth for the first time, the rubber dam can then tear and the operatory field is subjected to contamination, especially if mandibular teeth are considered. Even if a second successful clamping is achieved, contamination can still emerge from mouth.

The methods alone do not guarantee painless treatment for the patient because pain is dependent upon many factors, like clamp type, the patient tolerance to pain and psychological factors.

Advantages

The proposed methods are simple, relatively cost effective, do not require especial equipment and they have the potential to prevent tooth hypersensitivity, gingival trauma and pain.

There is no need of complementary anesthesia for both methods.

For the Dam Coverage Method, a wide operatory field is obtained without spending lot of time or causing excessive pain for the patient, since the dam exposes only a reduced number of teeth.

The Silicone Coverage Method has also an additional benefit of improving sealing around the clamped tooth, impairing contamination of the operatory field.

The two methods have the potential of preventing damage caused by clamping of ceramic/composite crowns.

Disadvantages

The Dam Coverage Method cannot be used when the treated tooth is the last one on the arch and consequently the last in the operatory field.

The Silicone Coverage Method is more expensive than traditional methods, despite being considered cost effective.

Both methods can only be used when the dam and the frame are placed together, before clamping.

CONCLUSIONS

The current authors purposed two simple methods for absolute operatory field isolation using a rubber dam. These methods use either a rubber dam or an impression material interposed between the clamp and the tooth to prevent tooth hypersensitivity (without additional anesthesia) as well to reduce sensitivity, provide little or no gingival trauma and better comfort to the patient during rubber dam isolation as well as in the postoperative period, thus improving patient care.

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RESUMO

Técnicas adesivas são mais sensíveis do que as convencionais, neste contexto, isolar o campo operatório é fundamental e o isolamento absoluto é o procedimento padrão-ouro. No tratamento endodôntico, o uso de um dique de borracha é reconhecido como padrão em cuidado de atendimento, no entanto, este é geralmente abandonado com o passar do tempo. Para aumentar a utilização de diques de borracha, adaptações das técnicas tradicionais têm sido sugeridas. Uma maneira possível de reduzir o trauma e a dor gengivais promovidos por grampos de isolamento seria a aplicação de uma fina camada de um material macio entre o grampo e o tecido dentário / gengival. **Objetivo:** O objetivo do presente trabalho é apresentar métodos alternativos de isolamento absoluto, melhorando assim o atendimento ao paciente. **Descrição:** Dois métodos são descritos: 1 –

Cobertura com o Dique, que consiste na apreensão do dique de borracha sobre o dente (colocando o grampo sobre o dique de borracha e os dentes, ao mesmo tempo, sem a inclusão do dente no campo operatório), 2 - Cobertura com Silicona: consiste no posicionamento da silicona de condensação ou adição do tipo massa densa (alta viscosidade) entre o dente e o grampo. **Conclusões:** Os autores apresentaram dois métodos simples para o isolamento absoluto do campo operatório usando um dique de borracha que podem reduzir a sensibilidade e minimizar ou até mesmo evitar o trauma gengival provocado pelos grampos de isolamento, oferecendo assim conforto para o paciente durante e após o procedimento, melhorando a qualidade do atendimento prestado ao mesmo.

PALAVRAS-CHAVE: Diques de borracha; Padrão de cuidado; Gengiva; Ferimentos e lesões; Dor; Prevenção e controle.

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