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RUBBER DAM

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МИНИСТЕРСТВО ЗДРАВООХРАНЕНИЯ РЕСПУБЛИКИ БЕЛАРУСЬ
БЕЛОРУССКИЙ ГОСУДАРСТВЕННЫЙ МЕДИЦИНСКИЙ УНИВЕРСИТЕТ
КАФЕДРА ОБЩЕЙ СТОМАТОЛОГИИ

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RUBBER DAM

Учебно-методическое пособие



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INTRODUCTION

The main aim of this textbook is to present rubber dam and to explain its necessity in dentistry.

The need to work under dry conditions, free of saliva, has been recognized for centuries, and the idea of using a sheet of rubber to isolate the tooth dates almost 150 years. The introduction of this notion is attributed to a young American dentist from New York, Sanford Christie Barnum, who in 1864 demonstrated for the first time the advantages of isolating the tooth with a rubber sheet. At that time, keeping the rubber in place around the tooth was problematic, but things soon improved a few years later, when in 1882 S. S. White introduced a rubber dam punch similar to that used still now. In the same year, Dr. Delous Palmer introduced a set of metal clamps which could be used for different teeth.

Rubber dam technique has been used for endodontic treatment for a long period of time. The sphere of the application of the rubber dam technique is increasing. It is used for carrying out restorative procedures in grown ups and children and for preventive placing of sealants. It is not by chance that the Center for Disease Control (USA) included a rubber dam as a necessary part for restorative procedures.

INDICATIONS FOR THE USE OF A RUBBER DAM. ADVANTAGES OF THE USE OF THE RUBBER DAM TECHNIQUE

The rubber dam technique was first introduced into dentistry in 1864 by an American dentist Dr. S. C. Barnum and was long considered to be an exotic method. However, over the past few years, quality conscious dentists have become much more interested in rubber dam techniques.

At present a rubber dam is used for the following:

- 1) for rapid drying of one or several teeth when filling in a tooth;
- 2) for placing sealants;
- 3) for ceramic and gold inlays, bridge prosthesis;
- 4) for endodontic treatment.

The rubber dam technique provides the following advantages during endodontic treatment.

1. Safety:

- prevents aspiration or swallowing of instruments;
- prevents trauma of the oral cavity mucosa due to instruments;
- prevents contamination of the pulp and periodont due to the bacterial flora of the mouth;
- is an additional means serving as a barrier for spreading of infectious diseases at a dentist's. A rubber dam is very important for protecting a dentist from a continuously increasing number of patients positive to hepatitis and human immunodeficiency virus (HIV).

2. Simplifies treatment techniques for the dentist:

- use of dry instruments;
- no rinsing;
- the patient cannot disturb the treatment by talking;
- the dentist works in a calm, stress free manner thanks to the high-contrast clearly visible working site;
- change of cotton rolls is eliminated;
- the dentist works in a dry cavity.

3. Advantages for the patient

- eliminates drying out of the oral cavity due to the saliva ejector;
- the elasticity of the rubber assists in keeping the mouth open over long periods of time;
- no unpleasant tasting irrigants leaking into the patient's mouth;

The rubber dam technique is reasonable in restoring teeth with composite materials using the acid etching technique. It is important that the etched surfaces are not contaminated with saliva. In carrying out multiple restorations it is difficult to etch all surfaces simultaneously and to ensure that the last surface remains absolutely dry until the restoration is finished. The cause of failure is saliva or sulcular fluid or the patient's breath. Etching of each surface separately can be done, but it will considerably increase the working time.

At the same time all surfaces can be etched simultaneously when using a rubber dam. The dentist will spend less time for placing a rubber dam than for separate etching of multiple surfaces. The problem of placing a rubber dam in the shortest possible time can be solved if three requirements are followed:

1. If the necessary material is available. The dentist should select the minimum and necessary set of instruments.
2. Organization of work.
3. Materials necessary for work must be prepared beforehand and sterilized.
4. Technique.

The rubber dam placing technique must be well done and the dentist must place the dam within seconds. It is necessary that rubber dam clamps should be fixed by a dental floss to prevent possible aspiration/swallowing.

Contraindications for the use of the rubber dam:

1. Diseases of the upper respiratory tract.
2. Allergy to the latex.

INSTRUMENTS

A RUBBER DAM

A rubber dam is a piece of a thin rubber easily stretched between fingers. A rubber dam is made of the best natural sources (latex) (fig. 1).



*Fig. 1. Types of rubber dam:
a — a rubber dam sheet; b — an opradam; c — a rubber dam roller*

A rubber dam is manufactured by different firms. The colour is different too: white, green, blue, grey. Most often blue and green are used. According to thickness a rubber dam can be light, medium and hard. The common size of the rubber dam is 15×15 cm. A rubber dam has two surfaces: smooth and mat. On placing the rubber dam it must touch the oral cavity with a smooth surface. It is desirable to place hydrophilic base between the face skin and the rubber dam. As a rubber dam is made of natural latex rubber, it must be kept in a refrigerator, otherwise it will become quickly old; if it is kept properly a rubber dam presents its qualities for a year.

FRAMES

The frames (fig. 2) are made of metal or plastic material. They are sterilized by autoclaving. The frames have the points to grip the rubber dam material. For endodontic treatment it is recommended to use the frame “a mouth of a fish” from a radiolucent plastic material with a joint that makes X-ray easier.



Fig. 2. Rubber dam frames

RUBBER DAM PUNCH

A rubber dam punch (fig. 3) ensures neat holes of any required diameters. It is possible to make holes for incisors, cuspids, premolars and molars.



Fig. 3. Rubber dam punch

Most of rubber dam punches have 5 hole variants in accordance with the tooth size. On moderate pulling the smallest hole increases in diameter and is 15 mm, on medium pulling it is 20 mm and the largest holes are 25 mm. If you

pull to make an ellipse the hole is even larger. The punch is designed in such a way that it prevents bunching up of the rubber dam material thus preventing accidental punching of the dam. To isolate the whole oral cavity the holes should be perfectly positioned. The dam must not be on one side with excess, leaving the other mouth corner open. To achieve the proper position hole places are marked with a template. For endodontic treatment one hole is done as a rule; for restorations and for placing sealants several holes are done.

RUBBER DAM CLAMP FORCEPS

Rubber dam clamp forceps (fig. 4) have points to hold the clamps and stops which enable the clamp to be pressed on the tooth. The stops prevent the clamp forceps slipping when the clamp is placed in position.



Fig. 4. Rubber dam clamp forceps

CLAMPS

Clamps are appliances for fixation a dam to a tooth. Traditional clamps consist of 2 jaws which grip the tooth below of its maximum bulge and an arch which acts as a connector. The clamp (fig. 5, *a*) consists of a central and front wing. In each clamp there is a perforated hole for clamp fixation. Each wing consists of a lateral and a mesial section. The lateral section holds the rubber away from the side surface of the tooth. The inner (mesial) section of the clamp must repeat the form and the curve of the tooth neck for which the clamp is used.

Clamps are used for fixing the rubber dam at the tooth neck and prevent shifting the dam by a cheek and a tongue during work. Clamps with wings are used predominantly in endodontic treatment. A clamp is chosen in accordance with the tooth, it must embrace the neck and do not move when a finger or instrument touch it. In order to check the clamp size, it is put on the tooth without a rubber dam.

Different firms currently offer a great number of clamps and their modifications. However only a limited number of clamps (from 5 to 10) is used in practice. Further description of some clamps is done by the leading clamp producer firm Ivory (USA):

Ivory N 0 — for lower incisors.

Ivory N 4 — for very large and medium premolars or very small molars.

Ivory N 14a — for deeply fractured or partially erupted molars.

Ivory N8a — as 14a but for smaller teeth.

Clamp N212 is required in addition when carrying out anterior cervical restorations or for endodontic treatment.

In the fig. 5, *b* you can see some of the clamps that are commonly used.

The set for work with a rubber dam should include a hemostat forceps. On carrying out X-ray the frame with a rubber dam is not removed, X-ray film is being hold with hemostat forceps. This forceps can be used for endodontic instrument fixation for detecting the obscured root canals. Thus the dentist's fingers will not block the line of vision.

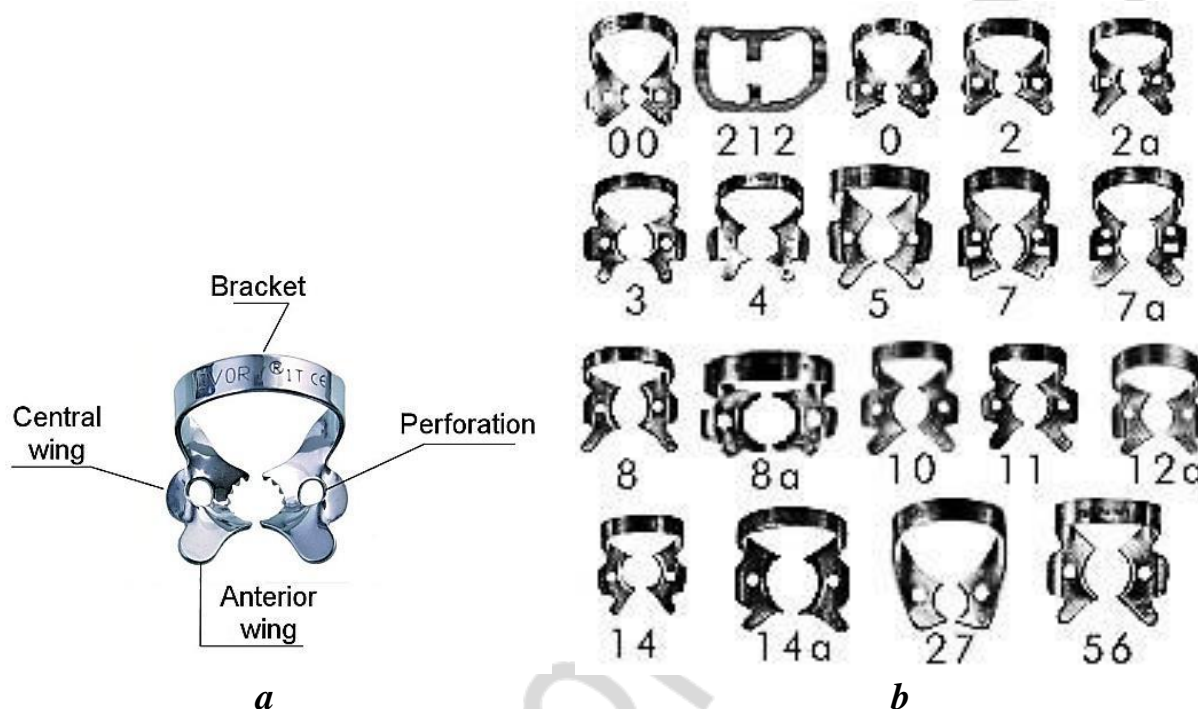


Fig. 5. Clamps:
a — a clamp structure; *b* — some of commonly used clamps

PREPARATION FOR WORK WITH A RUBBER DAM

Procurement of the materials and inspection of the teeth are of greatest importance.

ARMAMENTARIUM

1. Basic four instruments: mirror, explorer, cotton pliers, plastic instrument.
2. Rubber dam punch.
3. Rubber dam clamp forceps.
4. Rubber dam marked for punching.
5. Rubber dam frame.
6. Rubber dam napkin.
7. Two pieces of dental tape 18" long.
8. Rubber lubricant.
9. Saliva ejector.
10. Scissors.
11. R-D clamp or clamps.

Gross bits of calculus and other debris are removed, contact points are checked by the passage of dental tape, and sharp edges of enamel that might cut the rubber are removed. If the tooth to be prepared has an offending contact point (e. g. a sharp enamel edge or rough amalgam surface), the wise operator frees the contact with a bur or instrument so that placement of the dam does not result in a torn rubber septum. The clamp to be used has been tried on the tooth and tested to be sure it will not be dislodged by the pull of the rubber against the bow. If a clamp can be readily dislodged by the mirror handle, another, more secure clamp must be found. All clamps, particularly for second molar teeth, should be tested for stability before placing the rubber dam. Moreover, as a safety precaution dental tape should be tied in a bow as insurance against accidental dislodgement and aspiration of the clamp by the patient.

Another preparatory act that lends comfort to the patient is the application of an emollient such as Borofax to the lips, especially at the corners of the mouth. It is also expected that the operator will have anesthetized the tooth and punched the holes in the rubber.

Selection of the proper rubber dam clamp is a matter of experience and common sense, tempered with some intuition.

Although the clamp's shape and size fit most teeth, alteration of its jaws, wings, and prongs should be done as a matter of routine. A husky fissure bur rapidly transforms a stock clamp into a customized one. Although a clamp has been modified, it needs not to be discarded; preserving it for future use proves to be worthwhile.

A common necessary modification is to adapt the № 212 clamp to the clamp forceps. More often than not, the notches for the clamp forceps, are not sufficiently deep. Frequently the forceps slip out of the lingual notch when the operator attempts to maneuver the clamp in its "open" position. Deepening these two lingual notches is readily accomplished with a fissure bur.

Other modifications can be made in the beaks so that the clamps, fit flattened roots and narrow mandibular incisors. Overlapped and rotated teeth can frequently lend themselves to isolation by the use of a "half clamp". Although only minimal "spring" or grasping power is present, it is usually adequate to hold back the tissue and isolate the area.

Preparing for endodontic treatment.

1. Perfectly positioned holes for every tooth may be punched into the rubber dam, using the Ivory template.

2. Usually, only one tooth needs isolating when carrying out endodontic treatment (fig. 6, *a*). The fact that the hole may be out of place by a few millimetres is irrelevant when isolating a single tooth. Therefore, a universal hole can be punched into the dam when preparing the endodontic tray.

3. The assistant should punch the second largest hole slightly off-center in the dam, using the Ivory rubber dam punch. By twisting and turning the dam. This hole can be ideally positioned to correspond to every tooth. A smaller hole may possibly need to be punched when isolating lower incisors.

4. After opening a new pack of rubber dams, punch holes in a large number in advance. It is important to punch each dam separately as, otherwise, the size of the holes will vary and the dam may tear during placement.

5. In order to standardize placement and to ensure infection control, we recommend that those practices which use rubber dams regularly should have several clamp forceps, frames and № 1 as well as № 5 clamps. Only one of the remaining clamp sizes and one dam punch are required.

6. The punched dam is put on the tray, together with the radiolucent frame, the clamp forceps, winged clamps № 1 and 5 and the hemostat. The tray is then (wrapped, sealed, sterilized, stored in the cupboard) ready for use.

Preparing to place anterior restorations.

1. The rubber dam is supplied complete with 7 holes punched in an arch around its center.

2. The holes are spaced approximately the same as the anterior teeth.

3. The second smallest hole on the Ivory rubber dam punch is used to make all holes except the one at the end of the arch, which should be made using the second largest hole in the punch.

4. The best method is to mark 7 dots on the dam using a feltip pen and the template. The punched rubber is then put on the tray, together with the clamp forceps, wingless clamp №1, clamp № 212 and the frame. The tray is then stored, ready for use.

5. It is also possible to punch eight holes instead of seven (fig. 6, *b*). The second largest hole in the Ivory rubber dam punch is used at both ends of the arch. When doing so, two W1 clamps are put on the tray and are later used to hold both sides of the rubber dam. The assistant should put a dish containing a small amount of shaving soap on the tray, immediately prior to placement. The shaving soap lubricates the rubber dam while it is being slid between the contact points. Vaseline is unsuitable for this purpose as it is insoluble in water and is difficult to remove completely.



a



b

Fig. 6. Rubber dam placement

a — for endodontic treatment; *b* — for restorations on the frontal teeth

RUBBER DAM TECHNIQUES

The most simple isolation of the tooth from saliva with the rubber dam means that one or several holes are made in the latex, then it is placed on the teeth crowns to be isolated. The rubber edges are pulled on the external frame. There are several variants of the rubber dam techniques.

Technique № 1.

This technique has been used since the times, when it was proposed by Dr. Barnum:

- first the rubber dam is placed on a tooth crown;
- then the clamp is placed;
- after this the rubber dam edges are pulled on the frame.

This technique is used very rarely. Sometimes it is used in pedodontia.

Technique № 2.

First the clamp is fixed on a tooth, then the rubber dam is placed. The dentist sits at the eight o'clock position when isolating lower teeth and at the eleven o'clock position when isolating the upper teeth.

- the jaws of the clamp are placed into the clamp hole, and are placed on the tooth until it is fixed under the maximum bulge of the tooth;
- then the rubber dam with perforated holes is pulled by both hands and it is placed on the distal bow and it is pulled under the clamp wings;
- after that the rubber dam is placed on the frame.

This technique is available for endodontic treatment.

Technique № 3.

Variant A

- clamp wings are pushed under the rubber dam holes outside the oral cavity;
- then the clamp and the rubber dam are positioned on the tooth in one step;
- after that the frame is placed on the rubber dam;
- the rubber dam is placed under the clamp wings by a smoother.

This variant is used most often. One of the subvariants is the technique when the rubber dam is pulled over the frame beforehand. Many dentists consider this technique to be the most convenient and quick in practice.

Variant B

The clamp bow is placed over the rubber dam hole. Forceps jaws hold the clamp. Then the rubber dam is stretched on a bow in such a way that it is positioned over the rubber dam, the forceps is being on the lower side of the rubber dam in this stage. This stage is fully done by the dentist's assistant as a rule. In order to prevent aspiration or swallowing the clamp it is fixed on a dentist's finger with a dental floss beforehand. The rubber dam is bunched with one hand. The prepared rubber dam is held near the forceps. With the other hand the dentist places the clamp applying clamp forceps on the crown area of the tooth under the maximum bulge first lingually and then buccally. Before placing

the underside of the rubber dam it is smeared with a thin coat of special gel, shaving cream or liquid soap to allow the rubber dam to slide better. One should remember that the preliminary preparation of the filling edges is needed to escape the rubber dam tearing.

Ligature floss or special rubber may be used for the prevention the rubber dam tearing in case of tight teeth.

Rubber dam technique is used in multiple restorations of the upper and lower jaws. It should be noted that due to the rubber dam colour the tilling colour may be distorted. Due to that the composite material colour should be chosen before positioning the rubber dam. On carrying out restorations not one hole but several holes (6–7) are punched. The rubber dam is fixed with the damp on one of the teeth edges, wooden wedges are inserted in the interdental spaces. When sealing teeth with sealants in pedodontia the perforated holes are punched very close to one another in order to form one large perforated hole in the area of 2–3 sealed teeth. The rubber dam is fixed with the clamp on one of the teeth.

Slit Dam Technique

1. Slit Dam Technique does not provide absolute dryness for a prolonged period of time as it is in case with classic techniques. It does, however, provide short-term dryness and will exclude the patient's breath, and is suitable for applying sealants.

Procedure:

2. If required, the clamp can be secured with dental floss. Under certain circumstances, it is possible for the patient to inadvertently press the damp upwards with the tongue, when cotton rolls are positioned under the wings. The clamp can be secured by threading dental floss through the hole in the wing, knotting it above the wings, threading it through the other hole, knotting it again. The loose end of the floss is left hanging from the patient's mouth.

3. The rubber dam is prepared as follows: An elongated hole, for the teeth to be isolated, is punched out using the Ivory template (either punch a series of holes or join two holes with a scissor cut). A further hole is punched in the center of the dam for the saliva ejector. As usually similar groups of posterior teeth are isolated, an elongated hole can be punched in the dam instead of the universal hole intended for endodontic treatment. The dam can then be placed in any quadrant by twisting and turning it as required.

4. The rubber dam is positioned on the frame according to which quadrant it is to be placed in.

5. The clamp is placed on the distal tooth of the group to be isolated. Cotton rolls are pushed under the wings of the clamp.

6. Finally, grasp the rubber dam, complete with frame in both hands and press it on the clamp, so that the bow of the clamp is pressed through the elongated hole in the dam.

7. The dam is slipped over the wings of the clamp and drawn up to the mesial marginal ridge of the first tooth in the group to be isolated and pressed between the contact points cervically.

8. Should the interdental contact be very tight, use a wedge to separate the teeth. The wedge should remain in the interdental space until the dam has slipped between the contact points. Should a wedge alone not be sufficient, it is also possible to pull the rubber dam through the interproximal contacts by using dental floss. Any overhanging or sharp margins of restorations must be smoothed beforehand.

TEST

Check yourself.

Choose the right variant / variants.

1. The best aid for isolation of a single tooth or teeth from saliva in case of endodontic treatment is:

- a) sterile cotton rolls;
- b) saliva ejector;
- c) vacuum cleaner;
- d) rubber dam.

2. The best aid for isolation of a single tooth or teeth from saliva in case of hard tissue restoration is:

- a) sterile cotton rolls;
- b) a saliva ejector;
- c) a vacuum cleaner;
- d) a rubber dam.

3. If a rubber dam is not available for anterior and posterior restorations, endodontic treatment may be complicated by:

- a) instrument swallowing;
- b) instrument aspiration;
- c) trauma of the oral cavity mucosa by instruments;
- d) everything before mentioned.

4. The rubber dam technique provides the following advantages during root canal therapy:

- a) safety;
- b) simplifying treatment;
- c) a number of advantages for a patient;
- d) everything before mentioned;

5. A dentist should place and fix the rubber dam within:

- a) a few seconds;
- b) 2 minutes;
- c) 5 minutes.

6. Who was the first to introduce the rubber dam technique into dentistry?

- a) Foshar;
- b) Limberg;
- c) Barnum.

7. Is the rubber dam technique used in preparing teeth for an inlay?

- a) yes;
- b) no.

8. What instruments are used in rubber dam technique?

- a) a rubber dam;
- b) a frame;
- c) a rubber dam punch;
- d) a rubber dam clamp forceps;
- e) a clamp;
- f) everything before mentioned.

9. A rubber dam colour is:
 a) white; b) yellow; c) green; d) red; e) blue; f) violet; g) grey.
10. What surface must the rubber dam touch the oral cavity with?
 a) smooth; b) mat.
11. A rubber dam must be kept at?
 a) $t = +15\text{ }^{\circ}\text{C}$;
 b) $t = +20\text{ }^{\circ}\text{C}$;
 c) in a refrigerator (from $+4\text{ }^{\circ}\text{C} + 10\text{ }^{\circ}\text{C}$);
12. If a rubber dam is kept properly it presents its qualities for:
 a) half a year; b) a years; c) two years.
13. How many holes are done by a rubber dam punch in a rubber dam for restorations when restoring the hard tooth tissue?
 a) one; b) several.
14. How many holes are done by a rubber dam punch in a rubber dam when sealing the fissures by sealants:
 a) one; b) several.
15. A clamp includes:
 a) clamps c) two wings
 b) a bow; d) everything before mentioned.
16. The clamp forceps consists of:
 a) stops; b) an arch.

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