DANYLO HALYTSKY LVIV NATIONAL MEDICAL UNIVERSITY
Pediatric Dentistry Department

Methodological Recommendations on Propedeutics of Pediatric Therapeutic Dentistry for preparing of specialists of the second (master) level of higher education

(for the 2nd year students and lecturers)

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THEMATIC PLAN OF THE LECTURES
Propedeutics of Pediatric Therapeutic Dentistry

№	Theme of the lectures	Hour
1.	Historical stages of development of Pediatric Dentistry. Anatomical, morphological, histological and roentgenological features of a tooth, jaw system in children at different age period. Physiology of teeth eruption. Physiological signs of teeth eruption.	2
2.	The main principles of preparation of the hard tissues in children. The conditions of painless preparation. Peculiarities of preparation of the different classes of carious cavities of primary and permanent teeth in children.	2
3.	Dental filling materials for primary and permanent teeth. The main physycal-chemical and biological properties of filling materials. Classification. The basic criteria of choice. Peculiarities of filling of carious cavities with different materials.	2
4.	Modern endodontic tools. Classification, indication, technique of using.	2
5.	Principles of instrumental and medicamentous treatment of root canals in Pediatric Dentistry. Filling of root canals of primary and permanent teeth in children.	2
	Whole	10

THEMATIC PLAN OF THE PRACTICAL LESSONS
Propedeutics of Pediatric Therapeutic Dentistry

	Theme of the lesson	Hour
1.	Organization of work in dental clinic. Dental equipment and instruments, their types and indications. Disinfection and sterilization of the dental equipment and instruments. The main principles of four-handed dentistry.	2
2.	Topographical and anatomical peculiarities of anatomy of primary and permanent teeth on the different stages of its development. Making of phantoms with plastic and hard materials.	2
3.	Physiology and pathology of teeth eruption. Terms of root formation and resorption of primary and permanent teeth.	2
4.	The main rules and stages of preparation of carious cavities, elements of the carious cavity. Necessary tools for preparation of carious cavities.	2
5.	Preparation of Class I and V cavities in primary and permanent teeth with unformed root. Choice of instruments.	2
6.	Preparation of Class II, III, IV cavities in primary and permanent teeth with unformed root. Choice of the instruments.	2
7.	Classification of filling materials, its peculiarities and indications for use.	2
8.	Filling of carious cavities of Class I, Class V in primary and permanent teeth with dental cements and amalgam.	2
9.	Technique of filling of Class II restoration with dental cements and amalgam of primary and permanent teeth. Forming of the contact point.	2
10.	Resin based composites and compomers. Technique of filling of Class I and V carious cavities of primary and permanent teeth.	2
11.	Technique of filling of Class III and IV carious cavities of primary and permanent teeth in children. Restoration of the form, color of the tooth and the contact point.	2
12.	Technique of the instrumental and medicamental treatment of root canals of primary and permanent teeth with unformed roots. Modern endodontic instruments: types, indications, choice.	2
13.	Filling materials for the temporary and permanent obturation of root canals. Technique of filling of root canals of primary teeth.	2
14.	Technique of filling of root canals of permanent teeth at different stages of formation. The concept of apexogenesis and apexification.	2
15.	Differentiated credit	2
	Whole	30

THEMATIC PLAN OF THE SELF-WORK
Propedeutics of Pediatric Therapeutic Dentistry

№	Theme	Hours	Types of control
1	Preparing the practical, seminar lessons (theme: 1-14)	**28**	**Current:** during practical classes
2	Independent work that are not included in the plan of auditor lessons.	**22**	**Current:** during practical classes
	1. Modern conceptions of the carious cavity preparation (by Black, Lukomskyi, preparing for the preventive filling). Alternative methods of removing of carious injured tissues (chemical mechanical preparation of the carius cavities in children, ART-method)	3	
	2. Modern matrix systems and matrix holders. The technique of restoration of the contact point during the dental filling	4	
	3. Final polishing of the filling with various filling materials: the choise of the instruments, accessories, technique of completion.	4	
	4. Modern photopolymer lamps: types, indications, control of the lamp power. Protective means for the dentist and patient.	3	
	5. Modern materials for the permanent root obturation in permanent teeth: Calcium containing, polymeric, glass-ionomer and zinc-oxyde eugenol materials. There properties, technique of the use.	4	
	6. Adhesive systems and there use in dentistry. Types, compositions, features, technique of use.	4	
	Whole	**50**	

The method of organizing the practical classes of the discipline "***Propedeutics of Pediatric Therapeutic Dentistry***" includes:

1. Control of student's self-work of the preparation for the topic of the current practical lesson by checking the ***Workbook*** with the written execution of the proper tasks - ***10 minutes***.

2. Test control (level α-2) level of knowledge and determining the level of readiness of students to study - ***15 minutes***.

3. Individual oral interview of students, clarification of separate issues of the topic of the current class, answers to student questions - ***20 minutes***.

4. During ***40 minutes***, students independently work on phantoms on certain dental manipulations related to the treatment of caries and its complications in the primary and permanent teeth at different stages of root development. The teacher controls the work of students, gives an explanation, emphasizes the features of dental interventions in the teeth with unformed roots or in teeth at stage of root resorption.

5. Summary of the lesson - ***5 minutes***. After completing the practical lesson, the teacher summed up the results, gives students the task for independent work, points to the issues of the next topic and offers a list of recommended literature for self-study.

Material providing of the practical classes

- methodological recommendations
- a set of test tasks
- a list of theoretical questions and practical skills
- the tables
- the phantoms
- a set of tools for the preparation of carious cavities

- a set of endodic instruments
- filling materials for sealing carious cavities and root canals
- a set of radiographs

Practical Lesson № 1

Organization of work in dental clinic. Dental equipment and instruments, their types and indications. Disinfection and sterilization of the dental equipment and instruments. The main principles of four-handed dentistry

Aim of the lesson: to familiarize the students with the sanitary requirements for the organization and operation of the dental office, with the main types of dental instruments for therapeutic use and the basic rules of disinfection and sterilization of dental equipment and tools. Familiarize the students with the basic principles of ergonomics and requirements for the organization of the workplace of a dentist. Teach the students the rules of "four-handed dentistry"

Actuality: the need for up-to-date knowledge about a wide range of the dental equipment and tools, prevention of intra-hospital infection and the transfer of especially dangerous diseases through the use of the latest protocol of disinfection and sterilization with the help of new drugs. Modern dental equipment involves performing all medical manipulations by a dentist with an assistant in "four- handed dentistry " adhere to the principles of ergonomics

Control of the initial level of knowledge:

1. What is aseptic and antiseptic?
2. Name the sanitary requirements for the organization and equipping of the dental therapeutic office.
3. What types of the dental devices do you know?
4. What types of dental handpieces do you know?
5. What dental instruments are included in the standard set of doctor-dentist-therapist?
6. What is ergonomics? What are the basic principles of ergonomics?

Content of the lesson

At the beginning of the practical lesson the teacher meets students with clinic, main dental equipment, instruments. Students must know how they divided.

The teacher underlines that for work dentist need:

- machine;
- chair;
- moving chair for dentist;
- working table for dentist;
- medical box for remedies and filling materials;
- box for poison remedies;
- dish.

Hand instruments that are used in the operative dentistry may be categorized as: cutting (excavators, chisels), non-cutting (amalgam condensers, mirrors, explorers, probes). Most hand instruments are composed of three parts: handle, shank and blade).

A handpiece is a device for holding rotary instruments, transmitting power to them, and for positioning them intraorally. They developed as two basic types: straight and angle.

Rotating instruments can be divided into three groups: dental burs, abrading tools, polishing agents. Another method by which classification of rotary instruments can be made is through speed range: a high-speed range and a slow-speed range.

Common designs of burs are: round burs, plain fissure burs, crosscut fissure burs, inverted-cone burs, elliptical burs, twelve-blade carbide burs, finishing burs.

Students must know that all instruments that come into contact with saliva and blood should be sterilized. The first requiring for instrument sterilization is the removal of most organic debris, blood, and saliva. Following cleaning, the operator rinse instruments under running water and dry them before sterilizing.

The teacher underlines the importance of infection control in an operating environment. The following definitions will be useful in understanding the material that follows:

- antiseptics: agents that prevent the growth or action of microorganisms on living tissue;
- asepsis: the opposite of sepsis, i.e., freedom from infection; the prevention of contact with pathogens. In dentistry this includes the techniques of barrier protection, sterilization, and disinfection.
- cold sterilization: sterilization at room temperature, usually with an aqueous solution of a chemical. This type of sterilization is subject to serious drawbacks, including dilution, cutting short the required exposure time, organic contamination, or inactivation;
- cross infection: the transmission of pathogenic microorganisms from one patient to another;
- disinfectants: chemicals capable of killing pathogenic organisms when applied to inanimate objects.
- disinfection: The destruction of pathogenic agents by directly applied chemical or physical means;
- sepsis: the presence of pathogens in the blood or other tissues;
- sterilization: the destruction of all life. It is denotes the use of chemical or physical agents to eliminate all viable microorganisms, including bacteria, fungi, viruses, and spores.

The teacher underline that all instruments that come into contact with saliva or blood should be sterilized, using ADA-accepted methods of sterilization.

The main types of sterilization are:

- autoclave sterilization;
- dry heat sterilization;
- chemical vapor sterilization;
- glytaraldehyde sterilization.

The term ,“Ergonomics” has been used with most professions, but increasingly in the dental profession. It is a discipline that studies workers and their relationship to their occupational environment. This includes many different concepts such as, how dentists position themselves and their patients, how they utilize equipment, how work areas are designed and how all of this impact the health of dentists.

In Greek, “Ergo,” means work and, “Nomos,”means natural laws or systems. Ergonomics, therefore, is an applied science concerned with designing productsand procedures for maximum efficiency and safety. Itis also a study of the relationship among the personnel,equipment and environment in the work area. Properergonomic design is necessary to prevent repetitivestrain injuries, which can develop over time and can lead to long-term disability. Ergonomics is concerned

with the efficiency of persons in their working enviroment. It takes account of the worker ’s

capabilities and limitations to ensure that tasks,equipment, information and the environment suit each workerhas become a popular.

Elements of four-handed dentistry

The performance of four-handed dentistry requires certain basic elements for it to be effective. These elements are a mixture of mechanical and technical, factors that must be combined if the con is to succeed, and they are listed as follows:

1. Positive team attitude.
2. Favorable work environment.
3. Favorable positioning of the patient and operating team.
4. Simplified instrumentation.
5. Standard operating procedures.
6. Use of preset trays.
7. Efficient instrument delivery.
8. Effective oral evacuation and debridement.
9. Proper time management.

Positive team attitude. Both the dentist and the dental assistant must make a commitment to work together as a team. Working in a team configuration requires skills that must be acquired by both team members. Teamwork skills take time to develop. Each member of the team must be willing to communicate openly with one another and to help other members on a daily basis. Dental personnel who do not make this commitment often find themselves in frustrating circumstances that can lead to failure.

Favorable work environment. A wide variety of equipment and treatment room configurations work well in the four-handed dentistry concept. Regardless of which configuration is selected, the end result should be that both the dentist and the assistant can gain access and visibility during any procedure while maintaining comfort throughout the workday.

Proper positioning of the patient and operating team. Studies have been done to identify the most favorable working positions to use while working in the different segments of the oral cavity.

Simplified instrumentation. Dentists develop their own methods of accomplishing a given task. They may select a battery of instruments that differs from other dentists, but the same result is achieved. One goal that should be strived for is to reduce the number of instruments to only those needed for the procedure at hand. Using instruments and materials to the maximum and using them for several functions usually results in fewer instruments being included on a preset tray. This is consistent with work simplification principles discussed earlier in this chapter.

Standardized operating procedures. Most procedures performed in general practice are rather straightforward and can be done with minimal variation. As mentioned previously, common procedures can be standardized to the extent that the dental team can perform them in a predictable and efficient manner. A little planning and arranging is required, but the effort is certainly worthwhile for both the dentist and the assistant.

Use of preset trays. The convenience of placing the most common items needed for a dental procedure on a preset tray during instrument processing is significant.

Efficient instrument delivery. The transport of instruments and other items to and from the patient's oral cavity constitues a great deal of movement by the dentist who works alone. One of the most effective ways of reducing the amount of movement is motion economy principle.

The goal of fourhanded dentistry is to allow the dentist and assistant to function as a team in a seated position with maximal efficiency and minimal strain. Four-handed dentistry not only increases productivity, but also reduces stress and fatigue on the provider and assistant. Fourhanded dentistry can be used for all the specialty areas, and in operative dentistry. It is important to know the correct zones and positions that are assistant in relation to the patient and dentist. Also correct passing and receiving of instruments and materials to the dentist is a task that must be practiced to work efficiently with dentist.

The position of the patient is determined by the procedure to be performed, most dental treatment is provided with the patient in the supine position. Once the patient has been seated, the dentist and the assistant should place themselves in the proper positions for treatment. These positions are best understood by relating them to a clock. In the clock concept, an imaginary circle is placed over the dental chair, with the patient's head at the center of the circle at 12 o'clock. The clock is divided into four zones of operation:

- static zone
- assistant's zone
- transfer zone
- operator's zone

The use of these zones is the key to the efficient implementation of the principles of fourhanded dentistry. For right-handed dentists, seated to the right of the patient, the **operator's zone** is between 8 and 11 o'clock, and the **assistant's** zone is between 2 and 4 o'clock. For left handed dentists seated to the right of the patient, the **operator's zone** is between 1 and 4 o'clock position, and the **assistant's** zone is between 8 and 10 o'clock. Whenever the treatment site is on the lingual surfaces of the anterior teeth, the dentist (right or left-handed) generally uses the 12 o'clock position.

The **transfer zone** is from 4 to 8 o'clock. Instruments and materials are passed and received in this zone over the chest and at the chin of the patient. All instruments and materials are located in the assistant's zone.

The **static zone**, from 11 to 2 o'clock, is a nontraffic area where equipment, such as nitrous oxide, can be placed with the top extending into assistant's zone. When an objective is heavy, or material or an instrument is objectionable it held near the patient's face, assistant might pass or hold it in the static zone. As an example, anesthetic syringes are sometimes passed to the dentist in this area so that the patient will not be alarmed at the sight of the syringe. Part of this area can also be used when the provider is positioned in the 12 o'clock.

Dentist and dental assistants should sit with their back straight and head relatively erect. This helps prevent curvature of the spine. The patient should be lowered to a position that places the treatment site as close to the dentist's elbow level as possible. When the patient is properly positioned, the dentist's eyes should be 14 to 16 inches from the treatment site.

The assistant should sit as close as possible to the back of the patient's chair with his feet directed toward the head of the chair. This position lets assistant reach the treatment side, hose-attached instruments, and instruments and materials from the mobile cart or instrument tray without leaning, twisting, or overextending assistant's arms. In this position assistant are also able to observe the patient's responses throughout the procedure. The assistant's eye level is 4 to 6 inches above the dentist's eye level. Like the dentist, the assistant should sit in an erect position. The assistant's chair may have a curved, movable armrest. This armrest may be adjusted in front to support the body just below the rib cage. Using this armrest as a brace, assistant are able to lean slightly forward from the hips only. Assistant have to place his feet firmly on the foot-support ring at the base of the assistant chair so that his feet are parallel to the floor. The mobile cart or instrument tray should be placed toward the head of the patient's chair, and positioned to allow easy assistant access to the needed instruments and materials.

Passing and receiving instruments and materials.

To increase production while reducing stress and fatigue of the dentist and the assistant, they will need to work together as a team. Assistant must be able to anticipate the dentist's needs and fulfill those needs without unnecessary delay. To accomplish this, assistant must know the sequence of the treatment procedure and have the required instruments and materials ready at the proper time. When assistant assist in four-handed dentistry, he must also irrigate with air and water as well as aspirate with the high-volume evacuator throughout the procedure.

Instrument exchange. Instrument exchange between the dentist and assistant takes place in the transfer zone near the patient's chin. Assistant must anticipate the dentist's needs, and be ready when signaled by the dentist to pass the next instrument and received the used one in a smooth motion. An alert assistant does not need a verbal command to make the exchange, but should be constantly ready when the exchange signal occurs. Ideally, the instrument transfer is accomplished with a minimum of motion involving movements only of assistant's fingers, wrist, and the elbow. During the transfer, the dentist should not move the finger rest or eyes from the treatment side. When the exchange is completed, the dentist pivots the working hand back to the working position.

Assistant should arrange the instrument setup in an orderly fashion. Usually the instruments are set up from left to right, in the sequence in which they are to be used. Assistant should return them to their original position following use in case they need to be reused.

One-hand instrument exchange. For example, assistant is assisting a right-handed dentist and, therefore, are seated on the left side of a patient. Since his right hand is busy aspirating, he must learn to transfer instruments with his left hand.

The actual instrument transfer is divided into four stages – **working, signal, pre-transfer,** and **midtransfer.**

In the working stage, assistant picks up the next instrument to be used from the instrument tray with his left hand. Assistant grasps the instrument between his thumb and first two fingers by the end opposite from the working end. He holds the working instrument close to the treatment area and parallel to the instrument being used. He extends his little finger to receive the instrument being used by the dentist.

The signal stage takes place when the dentist signals for the next instrument by slightly raising the instrument from the tooth. During this stage, the dentist maintains his/her fulcrum (finger rest) and, with a pivotal action, rotates the working hand away from the patient's cavity. This position the used instrument so that assistant can grasp it with his little finger.

In the pre-transfer stage, assistant grasps the used instrument firmly using the little finger. Sometimes, assistant may prefer to use the last two or even three fingers to receive the used instruments. Following this action assistant carry out the mid-transfer stage. In this stage, assistant places the next instrument into dentist's hand with the working end positioned toward the treatment side. When the treatment site is located on the maxillary arch, assistant points the working end of the instrument *up*. Likewise, when the treatment site is on the mandible arch, position the working end *down*. Assistant do not release his grip of the new instrument until the dentist has firmly grasped the instrument.

As a result of research on the subject of time and motion in dentistry, a classification of common movements used during dental procedures was developed as follows:

Class I: Movement of only the fingers
Class II: Movement of the fingers and wrist
Class III: Movement of fingers, wrist, and elbow
Class IV: Movement of the entire arm from the shoulder
Class V: Movement of the entire arm and twisting of the trunk

Handpiece and Bur exchange. The dental handpiece can be exchanged for another instrument in the same manner. During the operative procedure the dentist holds the handpiece firmly over the patient's upper chest in the transfer zone, and then the assistant will loosen and remove the bur. The assistant next retrieves the bur that was selected by the dentist and places it into the dental handpiece and secures it. If the dentist uses a different instrument between bur exchanges, assistant changes the bur outside the transfer zone, usually over the tray setup.

Preparing and passing materials. Dental materials are exchanged at the patient's chin in the transfer zone. This prevent materials from being dropped on the patient' face. Small amounts of dental materials may be mixed and passed on a glass slab, paper pad, or dapped dish.

Assistant must prepare dental materials at the proper time during the procedure. A material mixed too soon does not allow sufficient handling time. Assistant begins mixing only when he knows the dental is ready.

Knowledge level control:

1. What dental equipment do you know?
2. What types of handpieces do you know?
3. On what groups dental instruments are divided?
4. What instruments are used for:

- oral cavity examination?
- tooth cavity preparation?
- tooth cavity restoration?

5. What is asepsis and antiseptics?
6. What is sterilization?
7. What types of sterilization do you know?
8. What is cold sterilization?

Tests:

1. Direct routs of disease transmision (choose the correct answer):

A. Through tiny cuts or cracks in the skin while working in the oral cavity
B. Through contact with an open woud or sore
C. Through contact with the eyes either by splatter of blood or saliva or by rubbing the eyes with contaminated hands
D. By swallowing organisms as a result of placing contaminated hands in or around the oral cavity
E. Use of contaminated instruments and devises

2. Indirect routs of disease transmision (choose the correct answer):
A. Use of contaminated instruments and devises
B. Cuts from contaminated instruments and needle sticks from contaminated anesthetic needles
C. Through tiny cuts or cracks in the skin while working in the oral cavity
D. Through contact with an open wound or sore
E. Through contact with the eyes either by splatter of blood or saliva or by rubbing the eyes with contaminated hands

3. Infection control includes the following elements (choose the incorrect answer):
A. Reviewing the patient's health status
B. Maintaning an aseptic microorganism – free technigue
C. Decontaminating instruments, dental eguipment, and work surfaces
D. Protecting the operating team
E. Any correct answer

4. The classification of common movements used during dental procedures:
A. Movement of only the fingers
B. Movement of the fingers and wrist
C. Movement of fingers, wrist and elbow
D. Movement of the entire arm from the shoulder
E. All mentioned above.

5. The barrier techniques includes the following elements (choose the correct answer):
A. Protective eyewear
B. Face masks
C. Clinic attire
D. Rubber gloves
E. All mention above

6. Elements of four - handed dentistry:
A. Standard operating procedures
B. Use of preset tray
C. Efficient instrument delivery
D. Proper time management
E. All mention above

7. Sit-down dentistry includes next components:
A. Proper equipment
B. Proper position of patient
C. Proper position the operative team
D. All mention above
E. Any correct answer

8. Sterilization is (follow the correct definition):
A. the process of removing debris and some organisms from instruments, devices, and work surfaces
B. the chemical destruction of most forms of microorganisms.
C. is the process of destroying all living microorganisms, including viruses and bacterial spores

9. Three major methods of the heat sterilization:
A. Autoclaving (moist-heat)
B. Dry-heat sterilization
C. Chemical vapor sterization

D. Salt sterilization

10. An auxiliary method of sterilizing endodontic files and reamers is
A. Autoclaving (moist-heat)
B. Dry-heat sterilization
C. Chemical vapor sterization
D. Salt sterilization

Practical Lesson № 2

Topographical and anatomical peculiarities of anatomy of primary and permanent teeth on the different stages of its development. Making of phantoms with plastic and hard materials

Aim of the lesson: to familiarise the students the dental anatomy of the primary and permanent teeth, their differences and particularities

Actuality: the knowledge of the features of the anatomical and topographical structure of the primary and permanent teeth in different stages of development provides proper diagnosis and treatment of teeth diseases in children.

Control of the initial level of knowledge:
1. Anatomical structure of different groups of the primary teeth
2. What is the sign of the root of the tooth?
3. What is the sign of the crown of the tooth?
4 What is the sign of curvature of the crown of the tooth?
5. Count the differences of the primary teeth from the permanent ones

Content of the lesson

At the beginning of the practical lesson the teacher underline the importance of such knowledge as dental anatomy of the primary and permanent teeth. Such knowledge give the possibilities to provide the caries lesions preparation without mistakes.

The tooth types in both arches of the primary dentition, 20 teeth in all, include 8 incisors, 4 canines, and 8 molars. The tooth types in both arches of the permanent dentition, 32 teeth in all, include 8 incisors, 4 canines, 8 premolars, 12 molars.

Each tooth type has a specific form. This form is related to the masticatory function of the tooth as well as to its role in speech and aesthetics.

Each tooth consist of a crown and one or more roots. The crown has dentin covered by enamel, and each root has dentin covered by cementum. The inner portion of the dentin of both crown and root also covers the pulp cavity of the tooth.

Further the teacher study the main tooth features with students on phantoms. Then they study the tooth anatomy, pulp chambers topography and anatomy features of incisors, canines, premolars and molars of primary and permanent teeth. Teacher underline that pulp chamber of primary teeth is wide and have thin walls. That's very important during preparation the teeth hard tissues to prevent the opening of pulp horn.

Primary maxillary central incisors. The crown is wider mesiodistally than incisocervically, have no mamelons, no pits are noted on the lingual surface. The single root is generally round and tapers evenly to the apex.

Primary maxillary lateral incisors. The crown is similar to the central incisor but is much smaller than the central in all dimensions. The incisal angles are more rounded than the central. The root is also similar to that of the central, but the lateral's root is longer in proportion to its crown, its apex is sharper.

Primary mandibular central incisors. The lingual surface appears smooth and tapers toward the prominent cingulum. The root is single, long and slender. The labial and lingual surfaces of the root are rounded, but the proximal surfaces are slightly flattened.

Primary mandibular lateral incisors. The crown is similar in form to the central incisor of the same arch, but crown is wider and longer that of the central. The root may have a distal curvature in its apical third.

Primary maxillary canine. The crown has a relatively long and sharp cusp. The mesial cusp slope is longer than the distal cusp slope on this tooth. A tubercle is often present on the cingulum, extending from the cusp tip to the cingulum. The root is twice as long as the crown.

Primary mandibular canine. The crown resembles the primary maxillary canine. This tooth is much smaller labiolingually. The distal cusp slope is much longer than the mesial cusp slope. The root is long, narrow, and almost twice the length of the crown, although shorter and more tapered than that of a primary maxillary canine.

Primary maxillary first molar. The occlusal table can have four cusps: mesiobuccal, mesiolingual, distobuccal and distolingual. Frequently, the distolingual cusp may be absent. The occlusal table also has a very prominent transverse ridge, oblique ridge. The tooth also has an H-shaped groove pattern. The tooth has three roots. The root trunk is short. The mesiobuccal root is wider buccolingually than the distobuccal root. The lingual root is the longest and the most divergent.

Primary maxillary second molar. The crown is larger than in the primary maxillary first molar. It usually has a cusp of Carabelli, the minor fifth cusp.

Primary mandibular first molar. The tooth has four cusps. The mesiolingual cusp is long, pointed, and angled in on the occlusal table. The tooth has two roots.

Primary mandibular second molar. The tooth is larger than the primary mandibular first molar. The three buccal cusps are nearly equal in size. The tooth has an overall oval occlusal shape.

Permanent incisors. The two types of incisors are the central incisors and the lateral incisors. Each incisor when newly erupted also has three mamelons. These teeth have lingua; fossa and marginal ridges on the lingual surface. Each incisor has one root.

Permanent canines. Each of the canines has only one cusp. When viewed from the proximal, appears triangular, like all anterior teeth. When viewed from the labial or lingual the canine crown outline appears pentagonal, with five sides, similar to the premolars. Canines are also wider labiolingually than the incisors – even wider than maxillary incisors. Similar to the other anterior teeth, each of the canines has an incisal edge. Different from the incisors is the cusp tip, which is line with the long axis of the root for both maxillary and mandibular canines when first erupted. The permanent canines are the longest teeth in the dentition. Each has a particularly long, thick root.

Permanent premolars. There are two types of premolars: the first premolar and the second premolar. As posterior teeth, premolars have a shorter crown than anterior teeth. The buccal surface of the premolars is rounded and has a prominent vertical buccal ridge in the center of the crown. Two buccal developmental depressions are noted on each side of the buccal ridge. Most premolars usually have one root, except for the permanent maxillary first premolar, which has two roots.

Permanent molars. There are three types of molars: the first molars, the second molars and the third molars. Each molar has a very large crown compared with the rest of the permanent dentition, but the crown is shorter occlusocervically in contrast to the teeth anterior to it. Molars have an occlusal surface with usually three or more cusps. Molars usually are multirooted: maxillary molars usually have three and mandibular molars have two root branches.

Morphologic differences between primary and permanent teeth:

1. The crowns of the primary teeth are wider mesiodistally in comparison with their crown length than are the permanent teeth.
2. The roots of primary anterior teeth are narrow and long in comparison with crown width and length.
3. The cervical ridge of enamel at the cervical third of the anterior crowns is much more prominent labially and lin-gually in the primary than in the permanent teeth.
4. The crowns and roots of primary molars are more slender mesiodistally at the cervical third than those of the permanent molars.

5. The cervical ridge on the buccal aspect of the primary molars is much more definite, particularly on the maxillary and mandibular first molars, than on the permanent molars.
6. The roots of the primary molars are relatively longer and more slender than the roots of the permanent teeth. There is also a greater extension of the primary roots mesiodistally. This "flaring" allows more room between the roots for the development of the premolar tooth crowns.
7. The buccal and lingual surfaces of the primary molars are flatter above the cervical curvatures than those of the permanent molars, thus making the occlusal surface narrower as compared with permanent teeth.
8. The primary teeth are usually lighter in color than the permanent teeth.

Knowledge level control:

1. Compare the anatomical features of the permanent dentition to those of the primary dentition.
2. Identify the particular anatomical features of each of the primary teeth.
3. Identify differences between the deciduous and permanent teeth.
4. Identify, compare and describe the facial, lingual, proximal, incisal, and occlusal aspects of the primary teeth.
5. Pulp anatomy, root anatomy.
6. Compare the pulpal anatomy of the permanent teeth.
7. Compare the formation of the pulp of the primary teeth to that of permanent teeth.
8. Discuss the importance of the pulpal anatomy.
9. Identify, describe and compare the root structures and pulp cavities of the deciduous teeth.
10. Identify, describe and compare the root structures and pulp cavities of the permanent teeth.
11. The Latin names of different tooth groups and their surfaces.
12. To name the tooth types of primary dentition.
13. To name the tooth types of permanent dentition.

Test:

1. The crown of the primary maxillary central incisor (choose the correct answer):
A. is wider mesiodistally than incisocervically
B. is wider incisocervically than mesiodistally
C. has mamelons and pits
D. has a relatively long and sharp cusps.

2.How many canines are there in the primary dentition?
A. 4.
B. 8.
C. 5.
D. 6.

1. How many pre – molars are there in primary dentition?
A. 4.
B. 6.
C. 8.
D. Any correct answer.

2. How many molars are there in primary dentition?
A. 6.
B. 4.
C. 8.
D. Any correct answer.

6. How many incisor are there in primary dentition?
A. 4.
B. 6.

C. 8.
D. Any correct answer.

7. How many pre – molars are there in permanent dentition?
A. 4.
B. 6.
C. 8.
D. 10.

8. The crown of the primary mandibular central incisors (choose the correct answer):
A. is wider mesiodistally than incisocervically
B. is wider incisocervically than mesiodistally
C. has mamelons and pits
D. the lingual surface appears smooth and tapers toward the prominent cingulum

9. The crown of the primary maxillary lateral incisors (choose the correct answers):
A. is wider mesiodistally than incisocervically
B. is wider incisocervically than mesiodistally
C. has mamelons and pits
D. the incisal angels are more rounded than the central ones

10. The crown of the primary maxillary first molars (choose the correct answers):
A. the occlusual table have four cusps.
B. is wider incisocervically than mesiodistally.
C the occlusual table has a very prominent transverse ridge, oblique ridge.
D.the incisal angels are more rounded than the central ones.

Practical Lesson № 3

Physiology and pathology of teeth eruption. Terms of root formation and resorption of primary and permanent teeth

Aim of the lesson: to teach thestudents the terms of eruption of the primary and permanent teeth. Familiarize the students with the main features of physiological teeth eruption. t teach the students the terms of formation and resorption of the roots of the primary and permanent teeth.

Actuality: the knowledge of the periods of eruption and formation of the primary and permanent teeth ensures the selection of appropriate therapeutic and preventive measures in children.

Control of the initial level of knowledge:

1. Terms of development and eruption of the primary teeth.
2. Terms of development and eruption of the permanent teeth.
3. Periods of development of the primary teeth.
4. Periods of development of the permanent teeth.

Content of the lesson.

The teacher underline that tooth eruption is physiological process in children.
The primary teeth eruption begins on 6-8 months of children's life and finishes in 2,5-3 years. The crown is developed until the moment of eruption. The tooth root is developed and finishing formed after tooth eruption. It's continues during 1,5-2 years as for primary teeth and 3-4 years as for permanent teeth.

Student must know the features of physiological tooth eruption and all the terms of eruption the primary and permanent teeth.

The signs of physiological tooth eruption are:

- timely tooth eruption (the average terms);
- sequence of some teeth groups eruption;
- symmetrical eruption.

When pathological eruption occurs, disturb one or all these signs.

Tooth eruption is a complex physiological process, which is regulated by central nervous system and is characterized by the development of dental and surrounding tissues, remodeled of bone. The tooth moves in an axial direction from its location within the alveolar crypt of the jaw into a functional position within the oral cavity. It is a normal process, which is taking place without any general or local pathological changes.

Active eruption is the movement of the tooth from its development side to the dental arch. Passive eruption does not involve tooth movement but occurs due to the gingival tissues exposing more tooth structure into oral cavity.

Histological phases of eruption:

1) pre-eruptive phase starts at the beginning of tooth development and ends when crown is formed. It is characterized by:
- growth of tooth germ (dental (enamel) organ, dental papilla, dental sac);
- formation of bony crypt;
- movement of developing tooth within the growing jaw.

2) prefunctional (Eruptive) phase starts at the beginning of root formation and ends when the tooth reaches occlusion with its antagonists. It is characterized by:
- formation of the root;
- bone apposition especially at the fungus of the crypt;
- initial organization of periodontal ligament;
- rapid active eruption.

3) functional (Posteruptive) phase starts when the erupting tooth reaches occlusion with its antagonists. It is characterized by:
- occlusal active eruption (more cementum and alveolar bone apposition);
- occlusomesial physiological drift (alveolar bone remodeling);
- organization of periodontal ligament principal fibers.

Basic principles in tooth eruption.

Active tooth eruption begins in an interosseous environment. The dental follicle regulates bone resorption, necessary for eruption. Like bone resorption, alveolar bone formation associated with tooth eruption depends upon the dental follicle and is associated with high cell proliferation. The basic principles of tooth eruption can be summarized as follows:

1. Any region of a dental follicle has the potential for initiating and regulating bone resorption and bone formation or for not influencing bone metabolism;
2. Movement of teeth during eruption consists of preparing a path through bone or soft tissues and moving them along this path;
3. Root formation is accommodated during tooth eruption and is a consequence, not a cause of the process;
4. Bone formation and root formation move an erupting tooth through the oral epithelium and into its position within dental arch at the occlusal plane. The periodontal ligament contributes substantially to eruption, but may have a role late in the process. Bone formation and possibly formation of apical cementum maintain a slow eruptive movement throughout the life of the tooth.

Speeds of tooth eruption. Erupting teeth move at different speeds at different times. Initially eruption is slow in bone. If there are prolonged delays, ankylosis of tooth to bone can result. The rate of eruption increases as the tooth is released from bone, penetrates the mucosa, and becomes very slow as it approaches the occlusal plane. These shifts in speed are also seen in root formation. It is fast at first, slows as the apical foramen narrows, and is very slow thereafter.

The primary teeth eruption begins on 6-8 months of children's life and finishes in 2,5-3 years. The crown is developed until the moment of eruption. The tooth root is developed and finishing formed after tooth eruption. It's continues during 1,5-2 years as for primary teeth and 3-4 years as for permanent teeth.

Primary tooth eruption

Eruption of the primary dentition takes place in chronological order. This process involves active eruption, which is the actual vertical movement of the tooth. Active eruption of a primary tooth has many stages in the movement of the tooth. After enamel apposition ceases in the crown area of each primary or permanent tooth, the ameloblasts place an acellular dental cuticle on the new enamel surface. In addition, the layers of the enamel organ are compressed, forming the **reduced enamel epithelium (REE)**

As this formation of the REE occurs for a primary tooth, it can begin erupt into the oral cavity. To allow for the eruption process, the REE first fuses with the oral epithelium lining the oral cavity. Second, enzymes from the REE disintegrate the central portion of the fused tissues, leaving an epithelial tunnel for the tooth to erupt through into the surrounding oral epithelium of the oral cavity. This tissue disintegration causes an inflammatory response known as "teething". As a primary tooth actively erupts, the coronal portion of the fused epithelial tissues peels back off the crown, leaving the cervical portion still attached to the neck of the tooth. This fused tissue that remains near the CEJ after tooth erupts then serves as the initial junctional epithelium of the tooth.

The primary tooth is then lost as the succedaneous permanent tooth develops lingual to it. The process involving loss of the primary tooth consists of differentiation of osteoclasts, which absorb the alveolar bone between the two teeth, and odontoclasts, which cause resorption or removal of portions of the primary's root of dentin and cementum as well as small portions of the enamel crown.

Permanent tooth eruption.

The succedaneous permanent tooth erupts into the oral cavity in a position lingual to the roots of the shed primary tooth. The only exception to this is the permanent maxillary incisors, which move to a more facial position as they erupt into oral cavity.

The process of eruption for a succedaneous tooth is the same as for the primary tooth. The process of the nonsuccedaneous permanent tooth's eruption is also similar, but no primary tooth is shed. Both succedaneous and nonsuccedaneous permanent teeth erupt in chronological order (tabl.1,2). A permanent tooth often starts to erupt before the primary tooth is fully shed, and problems in spacing can arise. Preventive orthodontic therapy can avoid some of these situations.

Table 1**The terms of eruption, root formation and resorption of primary teeth**

Tooth	*Beginning of mineralization (in utero)*	*Terms of eruption (months)*	*Finishing of root formation (years)*
I	4,5	6-8	1,5
II	4,5	8-12	2
III	7,5	16-20	4-5
IV	7,5	12-16	3-4
V	7,5	20-30	4

Table 2 **The terms of formation and eruption of permanent teeth**

Tooth	*Terms of tooth shedding*	*Beginning of mineralization*	*Terms of tooth eruption*
1	8 month in utero	6 months	6-8
2	8 month in utero	9 months	8-9
3	8 month in utero	6 months	10-11
4	2 years	5-6 years	9-10
5	3 years	6-7 years	11-12
6	8 month in utero	2-3 years	6
7	3 years	7-8 years	12-13
8	5 years	18-25 years	Different

Root Development. The process of root development takes place after the crown is completely shaped and the tooth is starting to erupt into the oral cavity. The structure responsible for root development is the **cervical loop**. The cervical loop is the most cervical portion of the enamel organ.

The cervical loop begins to grow deeper into the surrounding mesenchyme of the dental sac, elongating and moving away from the newly completed crown area to enclose more of the dental papilla tissue and form **Hertwig's root sheath**. The function of this sheath is to shape the root(s) and induce dentin formation in the root area.

Root dentin forms when **outer cells of the dental papilla** in the root area are induced to undergo differentiation and become odontoblasts. After the differentiation of odontoblasts in the root area, these cells undergo **dentinogenesis** and begin to secrete **predentin**. As in the crown, a basement membrane is located between the inner enamel epithelium of the sheath and the odontoblasts in the root area. When root dentin formation is completed, this portion of the basement membrane also disintegrates, as does the entire Hertwig's root sheath. Cells of the root sheath may become the **epithelial rests of Malassez**. These groups of epithelial cells become located in the mature periodontal ligament and can become cystic, presenting future problems.

Cementogenesis in the root area also occurs when Hertwig's root sheath disintegrates. As a result the undifferentiated cells of the dental sac come into contact with the newly formed surface of root dentin. This contact of the **dental sac** cells with the dentin surface induces these cells to become immature **cementoblasts**. The cementoblasts move to cover the root dentin area. As a result of the apposition of cementum over the dentin, the **dentinocemental junction (DCJ)** is formed. Also at that time, the **central cells of the dental papilla** are forming into the **pulp**.

The mesenchyme from the dental sac begins to form the **periodontal ligament (PDL)** adjacent to the newly formed cementum. This process involves forming collagen fibers that are organized into the fiber bundles of the PDL. The ends of these fibers insert into the outer portion of the cementum and the surrounding alveolar bone to support the tooth.

The mesenchyme of the dental sac also begins to mineralize to form the tooth sockets or alveoli of the alveolar bone surrounding the PDL.

Table 1**The terms of root formation and resorption of primary teeth**

Tooth	*Finishing of root formation (years)*	*Beginning of root resorption (years)*
I	1,5	from 5
II	2	from 6
III	4-5	from 8
IV	3-4	from 7
V	4	from 7

Table 2 **The terms of formation and eruption of permanent teeth**

Tooth	Terms of tooth eruption (years)	Terms of root formation (years)
1	6-8	10
2	8-9	10
3	10-11	13
4	9-10	12
5	11-12	12
6	6	10
7	12-13	15
8	Different	Different

According to T. F. Vinogradova(1976), root resorbtion in primary teeth is not a uniform process determined by the interrelation between the roots and germs.

Physiological root resorbtion is of three types:

Type I –uniform resorbtion of all the roots that stars at the area of apexies, extends vertically and decreases the tooth in length;
Type II – alongside with partial resorbtion of the roots and bifurcation area, there is observed more intense resorbtion of the root directed to the tooth follicle.
Type III - prevailing resorbtion of the bifurcation area. In this type of resorbtion, apical part of the root preserves its morphological validity, but the resorbtion of the bifurcation area is so intense as to results in connection with the coronal pulp.

Knowledge level control:

1. The terms of shedding the primary and permanent teeth.
2. The tooth anatomy.
3. The periods of dentition.
4. The features of physiological and pathological tooth eruption.
5. The terms of primary and permanent teeth eruption.
6. The sequence of primary and permanent teeth eruption.
7. Diseases of tooth eruption.
8. The terms of formation and resorption of the roots of primary tooth.
9. The terms of formation and resorption of the roots of permanent tooth.
10. The steps of primary and permanent root teeth formation.
11. The types of primary root teeth resorption.
12. The mixed dentition, its definition, terms.
13. Changes in oral cavity before tooth eruption.

Tests:

1. Terms of eruption of primary central incisor:
A. 6-8 month
B. 8-10 month
C. 10-12 month
D. 12-14 month

2. The terms of eruption of primary lateral incisor:
A. 6-8 month
B. 8-10 month
C. 10-12 month
D. 12-14 month

3. The terms of eruption of primary canine:
A. 6-8 month
B. 8-10 month
C. 10-12 month
D. 16-20 month

4. The terms of eruption of primary first molar:
A. 6-8 month
B. 8-10 month
C. 12- 16 month
D. 16-20 month

5. The terms of eruption of primary second molar:
A. 6-8 month
B. 8-10 month
C. 16- 20 month
D. 20-30 month

6. How many teeth are there in primary dentition?
A. 20
B. 22
C. 30
D. 32

7. How many teeth are there in permanent dentition?
A. 20
B. 22
C. 30
D. 32

8. The sequence of eruption of the primary teeth:
A. 1, 2, 4, 3, 5
B.1, 2, 3, 4, 5
C. 1, 2,5,4,3
D. 5, 1,2,3,4, 5

9. The sequence of eruption of the permanent teeth:
A. 6, 1, 2, 4, 3, 5, 7, 8.
B. 1, 2, 3, 5, 6, 7, 8.
C. 6, 1, 2, 3, 4, 5, 7, 8.
D. 1, 2, 4, 3, 5, 6, 7, 8.

10. The histological phases of the eruption are:
A. pre – eruptive phase.
B. pre – functional (eruptive) phase.
C. functional (post – eruptive) phase.
D. All mention above.

Practical Lesson № 4

The main rules and stages of preparation of carious cavities, elements of the carious cavity. Necessary tools for preparation of carious cavities

Aim of the lesson: To teach the students the basic rules of the stages, the general principles of preparation of the carious cavities, to master the necessary tools for the preparation.

Actuality: the knowledge of the basic rules, features, stages, principles of preparation of the carious cavities of Class I and V in the primary and permanent teeth with unformed root allows toavoid mistakes at this stage of treatment of caries
Control of the initial level of knowledge.

Control of the initial level of knowledge:
1. Classification of carious cavities after Black.
2. Anatomical structure of various groups of the primary teeth.
2. Features of the structure of the tissues of the tooth in the primary and unformed permanent teeth
3. Features of the topography of the cavity of the primary and unformed permanent teeth.
4. Classification of burs for the preparation of the carious cavities, their types and purpose.

Content of the lesson

Black's classification of caries lesions utilizes the specific location of the common lesions on the teeth as they usually occur. It is as follows.

Class I. Class I lesions occur in pits and fissures of all teeth, but this class essentially intended for bicuspids and molars.

Class II. A cavity occurring on the proximal surface of a posterior tooth belongs to the Class II category. Class II lesion can involve both mesial and distal surfaces or only one proximal surfaces of a tooth and is referred to as an MO, a DO, or an MOD.

Class III. Class III lesions afflict the anterior teeth. By Dr. Black's definition, a Class III cavity may occur on the mesial or distal surface of any incisor or cuspid.

Class IV. Class IV, as defined by Dr. Black, is a lesion on the proximal surface of an anterior tooth, from which the incisal angle is also missing.

Class V. Class V cavity can occur or either the facial or the lingual surfaces. Class V cavities can involve cementum as well as enamel.

Class VI. This cavity is found on the tips of cusps or along the biting edges of incisors.

At the beginning of the lesson the teacher underline that students must know the main steps in cavity preparation. They are:

Step 1: Outline of the proposed restoration.

Step 2: Resistance and retention considerations.

Step 3: Access for removal of carious dentin and placement of the restoration.

Step 4: Carious dentin removal.

Step 5: Refinement of the internal part the cavity.

Step 6: Refinement of preparation margins.

The cavity preparation designs for tooth-colored restorative materials are essentially the same, irrespective of which material will be placed. First, the preparation must involve the surgical removal of the pathology caused by caries.

Flat walls with or perpendicular to the tooth surface compose the form of the box-like preparations. Anchorage of the material is achieved by parallelism of opposing walls or by slight undercuts in the dentin.

Caries in the primary teeth are not different from caries in the permanent teeth, and the same general principles of operative dentistry apply. Certain variations in technique are necessary, however, due to the size and morphology of the primary teeth.

General consideration:

1. All cavo-surface angles should be 90 degrees.
2. A uniform depth of cavity preparation is desirable.
3. No bevel is required for the gingival enamel wall in primary teeth

Knowledge level control:

1. Define the principles of the carious cavity preparation
2. Which methods of carious prepatations do you know
3. Name the elements of the preparated carious cavity
4. Name the stages of preparation of carious cavities
5. Classification of carious cavities after Black

Tests:

1. What is the sequence of the tooth cavity preparation?

A. Opening and widening of the carious cavity, tooth cavity formation, enamel margins preparation, necrectomy

B. Opening and widening of the carious cavity, necrectomy, tooth cavity formation, enamel margins preparation

C. Necrectomy, tooth cavity formation, opening and widening of the carious cavity, enamel margins preparation

D. Enamel margins preparation, necrectomy, tooth cavity formation, opening and widening of the carious cavity

E. Tooth cavity formation, enamel margins preparation, necrectomy

2. How many classes of carious cavities are defined by Dr. Black?

A. 8

B. 3

C. 7

D. 5

E. 4

3. What angle between the floor and walls is the most correct for the tooth cavity preparation by Dr. Black?
A. 75°
B. 45°
C. The angle is not important
D. 90°
E. 110°

4. What instruments should be used for bevel formation?
A. Fissure diamond finishing burs
B. All answers are correct
C. Inverted conical dental drill
D. Round diamond burs
E. Butt end shaped bur

5. What angle is the most appropriate for the bevel formation?
A. 90°
B. 60°
C. The angle is not important
D. 30°
E. 45°

6. Necrectomy is:
A. Softened dentin removing
B. Removing of overhanging enamel edges
C. Shaping of the carious cavity due to which the better filling fixation can be achieved
D. Bevel formation
E. All answers are incorrect

7. What is the name of the new saving approach the modern dentist accept to the carious cavity formation, due to which teeth tissues are removed safety till the visibly intact tissues?
A. Biologically expedient
B. Extension for the secondary caries prevention
C. Technical expedient
D. No correct answers
E. All answers are correct

8. What is the sequence of the tooth cavity preparation?
A. Opening and widening of the carious cavity, necrectomy, tooth cavity formation (including additional cavity on the occlusal surface), enamel margins preparation

B. Opening and widening of the carious cavity, tooth cavity formation, enamel margins preparation, necrectomy
C. Tooth cavity formation, enamel margins preparation, necrectomy
D. Enamel margins preparation, necrectomy, tooth cavity formation, opening and widening of the carious cavity
E. Necrectomy, tooth cavity formation, opening and widening of the carious cavity, enamel margins preparation

9. What surface of the tooth should be used for the additional cavity formation?
A. Occlusal surface
B. Cervical surface
C. Proximal surface
D. Distal surface
E. The additional cavity is not necessary

10. The additional cavity is not necessary
A. For the better filling fixation and even distribution of chewing pressure on the tooth
B. Better adhesion of the filling material to the tooth structure
C. For the better distribution of chewing pressure on the tooth
D. To avoid pulp cavity perforation
E. To avoid injury of the gingival margin

Practical Lesson № 5

Preparation of Class I and V cavities in primary and permanent teeth with unformed root. Choice of instruments

Aim of the lesson: To teach тхе students the stages, the general principles of preparation of carious cavities I, V classes of тхе primary and permanent teeth with unformed roots.

Actuality: the knowledge of the stages, principles and features of the preparation of carious cavities of classes I and V in тхе primary and permanent teeth with unformed root allows to avoid errors at this stage of treatment of caries.

Control of the initial level of knowledge:
1. Anatomical structure of different groups of the primary teeth.
2. Features of the structure of the tissues of the primary and permanent teeth
3. Features of the structure of the cavity of the primary teeth.
4. Classification of instruments for the preparation of carious cavities
5. Classification of carious cavities after Blacks

Content of the lesson.
Procedures for Class I preparation:
1.Assemble the appropriate armamentaria.
2.Check the occlusion prior to cavity preparation so that the most appropriate outline can be determined.
3.Established the outline form.
-Enter the tooth through a pit or fissure area with a fissure bur.

-At established depth, extend the bur into all fissured grooves until sound tooth structures are reached.

-As the marginal ridges are approached, slope the bur approximately to prevent undermining the enamel of these walls.

-Slope the walls of the buccal and lingual developmental groove extensions in the same manner to prevent undermining and reakening of the buccal and lingual walls.

2. Establish the resistance form.
   - Smooth pulpal wall with appropriate burs and/or hand instruments. The pulpal wall should be at right angles (perpendicular) to the long axis of the tooth.
   - Make sure wall is completely in dentin.
3. Establish the retention form.
   - Buccal and lingual walls should very slightly coverage toward the occlusal surface or be parallel to each other.
   - Buccal and lingual walls should be parallel or slightly convergent. Mesial and distal walls and the buccal and lingual developmental groove extensions should be slightly sloped to create an obtuse angle with the pulpal wall.
4. Establish the convenience form.
   - For Class I cavity preparations, convenience form is usually obtained when outline form requirements are satisfied.
5. Remove remaining caries with spoon excavators and/or very slow rotating bur.
6. Finish enamel walls and margins with slowly rotating finishing burs.
7. Prepare toilet of the cavity:
   - Scrub all debris free with moistened cotton pellets;
   - Flush out cavity preparation with air-water spray;
   - Dry cavity preparation with air. Be carefully not to desiccate or dehydrate tooth structure by using prolonged or continuous blasts of air.

Procedures for Class V preparation:

1.Assemble the appropriate armamentaria.

2.Establishthe outline form

- Enter the tooth in the area of the lesion with a round bur, extending into the De junction (1.0mm). With a fissure bur and at this established depth, extend the preparation to a rough final outline form.
- Extend to final outline form with a slow-speed inverted cone bur, making sure to include all areas of caries and decalcification. Occlusal and gingival walls should be parallel to the occlusal plane and to each other.
- Ideal depth for this cavity preparation is: 1.0 – ideal width of occlusal wall; 0.6 mm – ideal width of gingival wall

3.Establish resistance and retention form.

4.Establish the convenience form.

5.Remove remaining caries.

6.Finish enamel walls and margins.

7.Prepare toilet of the cavity preparation.

<u>Knowledge level control:</u>

1. The definition of "caries".
2. Clinical application of explores.
3. Clinical application of mirror.
4. What caries cavities are the I, V Classes?
5. What are the main composed parts of caries cavity?
6. What are the main steps in cavity preparation?
7. Which types of burs are applied during each step of caries cavity preparation of
8. I, V Classes
9. Instrumental Resume for the Class V preparation.
10. How do we isolate the working areas when dealing with any Class V lesion?

11. What ways of achieving retention in Class V do you know?

Tests:

1. What carious cavities are referred to the Class I by Dr. Black classification?
A. Lesions occur in fissures and pits of molars and bicuspids
B. Cavities occur on the proximal surfaces of posterior teeth
C. Lesions afflict the proximal surfaces of anterior teeth without including the incisal angle.
D. Lesions afflict the proximal surfaces of anterior teeth with involving the incisal angle
E. lesion localized on the cervical surface of all groups of teeth.

2. What is the sequence of the tooth cavity preparation?
A. Tooth cavity formation, enamel margins preparation, necrectomy
B. Opening and widening of the carious cavity, tooth cavity formation, enamel margins preparation, necrectomy
C. Opening and widening of the carious cavity, necrectomy, tooth cavity formation, enamel margins preparation.
D. Enamel margins preparation, necrectomy, tooth cavity formation, opening and widening of the carious cavity.
E. Necrectomy, tooth cavity formation, opening and widening of the carious cavity, enamel margins preparation.

3. What types of instruments are used for opening of the carious cavity during preparation?
A. Diamond fissure and round burs, excavators, and probe
B. Smoother, round burs
C. Excavator, probe, fissure burs
D. Diamond fissure and round burs
E. Fissure and round burs, excavators, probe, smoother.

4. What carious cavities are referred to the Class V by Dr. Black classification?
A. Lesions occur in fissures and pits of molars and bicuspids
B. Cavities occur on the proximal surfaces of posterior teeth
C. Lesions afflict the proximal surfaces of anterior teeth without including the incisal angle.
D. Lesions afflict the proximal surfaces of anterior teeth with involving the incisal angle
E. Lesions are localized on the cervical surfaces of all groups of teeth.

5. What peculiarities of permanent and primary teeth structure should be taken into consideration while tooth preparation?
A. Thickness of hard tissues of the primary teeth is less than permanent
B. Hard tissues of the primary teeth are less mineralized considered to permanent
C. The pulp chamber of the primary teeth is bigger considered to permanent
D. Corn of pulp are localized closer to the cusps in the primary teeth
E. All mentioned above.

6. How many classes of carious cavities are defined by Dr. Black?
A. 8
B. 4
C. 7
D. 5
E. 3

7. What types of instruments are used for necrectomy of the carious cavity during preparation?
A. Round burs, excavator
B. Smoother, fissure burs
C. Excavator, diamond round burs, probe

D. Fissure burs
E. Plugger, excavator.

8. What angle between the floor and walls is the most correct for the tooth cavity preparation by Dr. Black?
A. 45°
B. 110°
C. 90°
D. 75°
E. The angle is not important.

9. What instruments should be used for bevel formation?
A. Round diamond burs
B. Fissure diamond finishing burs
C. Inverted conical dental drill
D. Butt end shaped bur
E. All answers are correct

10. What angle is the most appropriate for the bevel formation?
A. 30°
B. 60°
C. 45°
D. 90°
E. The angle is not important

Practical Lesson № 6

Preparation of Class II, III, IV cavities in primary and permanent teeth with unformed root. Choice of the instruments

Aim of the lesson: to teach the students the stages, general principles of preparation of the carious cavities II, III, IV classes of the primary and permanent teeth with unformed roots.

Actuality: the knowledge of the features of the preparation of carious cavities of II, III, IV classes of the primary and permanent teeth with unformed root allows to provide a positive prognosis of treatment and to prevent complications.

Control of the initial level of knowledge:
1. Anatomical structure of various groups of tthe primary teeth.
2. Features of the structure of the tissues of the tooth of the primary and permanent teeth
3. Features of the structure of the cavity of the primary teeth.
4. Classification of instruments for the preparation of the carious cavities
5. Classification of carious cavities after Blacks

Content of the lesson

A cavity occurring on the proximal surface of a posterior tooth belongs to the Class II category. Class II lesion can involve both mesial and distal surfaces or only one proximal surfaces of a tooth and is referred to as an MO, a DO, or an MOD.
Sequence of preparation:

The incipient Class II restoration is essentially a bur preparation.
Step 1: The preparation involves relevant pits and grooves. This is done with a round bur.

Step 2: The operator cuts a notch with a round bur through the marginal ridge to expose the dento-enamel junction. Care should be exercised lest the adjacent tooth be nicked with a bur. It is also quite important that the operator has reached and identified the dentin.
Step 3: The operator having established the orifice of the "inverted slot", enter the dentin with the round or pear-shaped bur and cut a narrow groove facio-lingually underneath the proximal layer of enamel. The enamel plate will be still intact.
Step 4: The enamel plate is penetrated with a vertical groove. Special care should be exercised to avoid defacing the enamel of the adjacent tooth.
Step 5: After being weakened the groove the enamel plate can be fractured off, with the blade instrument (hatchet, chisel, or excavator) acting as a pry. If the undermining has been done properly the enamel rods will fracture away neat and clean right up to the border left by the bur.
Step 6: Plane the margins. Refinement of preparation margins.
Step 7: Prepare toilet of the cavity preparation.

The completed Class II preparation should demonstrate the following criteria:
Outline form:
- Classic ideal occlusal outline form.
- All cavosurface margins on relatively smooth surfaces.
- Ideal isthmus width (1.0-1.5 mm).
- Sloped walls for protection of non-involved marginal ridges and major developmental grooves.
- Margins flow "around the cusps".
- No sharp angles on the cavosurface outline; no cavosurface bevels.
- No margins in wear facet areas.
- Pulpal wall perpendicular to long axis of tooth.
- Occlusal and buccoproximal portions meet with a smooth reverse ("S") curve.
- Gingival wall straight and at right angles to the long axis of the tooth.
- Angulations of proximal walls reflect consideration of functional and non-functional cusp positions.
- All proximal cavosurface margins are at right angles to the external tooth surface.

Resistance, retention, and convenience form:
- Pulpal wall at ideal depth (1.5mm) from occlusal cavosurface margin.
- Gingivoaxial line angle at ideal depth (1.0mm) from gingival cavosurface margin.
- Pulpal and axial walls entirely in dentin.
- Axiopulpal line angle should not be sharp.
- Buccal and lingual walls of occlusal portion parallel or slightly convergent.
- All internal walls smooth and line angles sharp.
- Reverse ("S") curve present on buccal.
- Retentive grooves placed at buccoaxial and linguoaxial line angles and extending from level of gingival wall to level of pulpal wall.
- Axial wall slightly sloped toward the occlusal.
- All debris removed from cavity preparation.

Class III lesions afflict the anterior teeth. By Dr. Black's definition, a Class III cavity may occur on the mesial or distal surface of any incisor or cuspid.
Class IV, as defined by Dr. Black, is a lesion on the proximal surface of an anterior tooth, from which the incisal angle is also missing.
Procedure for Class III Preparation:
1.Assemble the appropriate armamentaria.
2.Establish the outline form:
- With a small round bur held perpendicular to the lingual plane of the tooth, enter the tooth at a point just lingual or slightly gingival to the interproximal contact area. Extend labially to the approximate final location of the labial wall;
- Use an incisogingival "brush" stroke with the bur as the labial wall is approached.
- Break out the thinned enamel shell with a small enamel hatchet and plane all walls to final outline form with the enamel hatchet or gingival margin trimmer.

3.Establish resistance and retention form:
- Smooth incisal and gingival walls;
- Smooth the labial wall;
- Plane and smooth the axial wall and lingual cavosurface margin;
- Place retention along gingivoaxial line angles with either a round bur or a gingival margin trimmer.

4.Establish the convenience form.
5.Remove remaining caries (caries is removed with spoon excavators and/or very slowly rotating round burs).
6.Finish enamel walls and margins (walls may be planed either with slowly rotating finishing bur or an appropriate hand instruments).
7.Prepare toilet of the cavity:
- Scrub all debris free with moistened cotton pellets;
- Flush out cavity preparation with air-water spray;
- Dry cavity preparation with air. Operator should be careful not to desiccate or dehydrate tooth structure by using prolonged or continuous blasts of air.

The completed Class III cavity preparation should demonstrate the following criteria:
1.Outline form:
- Classis "slot" design with incisal and incisal and gingival walls parallel to each other and perpendicular to the lingual plane of the tooth;
- Labial, incisal, and gingival walls just free of proximal contact with the adjacent tooth;
- Labial wall gently curved to approximate labial contour of adjacent tooth;
- Incisal and gingival walls separated by about 2.0 mm;
- Lingual cavosurface margin not in any wear facet area;
- All cavosurface margins are at right angles to the external tooth surface;
- All cavosurface angles slightly rounded.

2. Resistance, retention and convenience form:
- Axial wall in dentin and 1.0 mm from the external surface;
- Retention placed along lengths incisoaxial and gingivoaxial line angles;
- Labioaxial line angle sharp but not retentive;
- All internal walls smooth;
- All debris removed from cavity preparation.

3.Cases involving large carious lesions may require additional retentive features to retain the amalgam restoration;
- The "lingual lock" design is a modification of the slot design that provides additional retention. The lingual lock is very similar to the occlusal dovetails in Class I cavity preparations.

Knowledge level control:

1. What stomatological instruments we use for the caries lesions preparation.
2. What caries cavities we refer to the II Class?
3. What are the main composed parts of Class II cavity?
4. What are the main steps in Class II cavity preparation?
5. Which types of burs are applied during each step of caries cavity preparation of? II Class?
6. How do we isolate the working areas when dealing with any Class II, III, IV lesion?
7. What ways of achieving retention in Class II do you know?
8. What are the main composed parts of caries cavity in III, IV Classes?
9. What are the main steps in cavity preparation in III, IV Classes?
10. Which types of burs are applied during each step of caries cavity preparation of III, IV Classes?
11. What ways of achieving retention do you know?
12. What groups of dental instruments do you know?

Tests:

1. What carious lesions are referred to the Class II cavities by Dr. Black classification?

A. Lesions occur in fissures and pits of molars and bicuspids
B. Cavities occur on the proximal surfaces of posterior teeth (mesial and distal; only one proximal surface)
C. Lesions afflict the proximal surfaces of anterior teeth without including the incisal angle.
D. Lesions afflict the proximal surfaces of anterior teeth with involving the incisal angle
E. Lesion localized on the cervical surface of all groups of teeth.

2. What is the sequence of the tooth cavity preparation?
A. Opening and widening of the carious cavity, necrectomy, tooth cavity formation (including additional cavity on the occlusal surface), enamel margins preparation.
B. Opening and widening of the carious cavity, tooth cavity formation, enamel margins preparation, necrectomy
C. Tooth cavity formation, enamel margins preparation, necrectomy
D. Enamel margins preparation, necrectomy, tooth cavity formation, opening and widening of the carious cavity.
E. Necrectomy, tooth cavity formation, opening and widening of the carious cavity, enamel margins preparation.

3. What surface of the tooth should be used for the additional cavity formation?
A. Cervical surface
B. Occlusal surface
C. Proximal surface
D. Distal surface
E. The additional cavity is not necessary

4. What is the main purpose of the additional cavity formation?
A. Better adhesion of the filling material to the tooth structure
B. For the better filling fixation and even distribution of chewing pressure on the tooth
C. For the better distribution of chewing pressure on the tooth
D. To avoid pulp cavity perforation
E. To avoid injury of the gingival margin

5. What types of instruments are used for opening of the carious cavity during preparation?
A. Diamond fissure and round burs, excavators, and probe
B. Smoother, round burs
C. Excavator, probe, fissure burs
D. Hatchet (excavator), chisel, pear shaped bur
E. diamond fissure and round burs

6. What angle should be formed between the main and additional cavity?
A. 45°
B. 90°
C. 110°
D. 75°
E. The angle is not important

7. What peculiarities of permanent and primary teeth structure should be taken into consideration while tooth preparation?
A. Thickness of hard tissues of the primary teeth is less than permanent
B. Hard tissues of the primary teeth are less mineralized considered to permanent
C. The pulp chamber of the primary teeth is bigger considered to permanent
D. Corn of pulp are localized closer to the cusps in the primary teeth
E. All mentioned above

8. What should be taken into the consideration during Class II cavity preparation?
A. The deepness of the carious cavity preparation
B. Not to injure the adjacent teeth as the tooth cavity of the affected tooth is located too close to it
C. Not to affect the proximal gingival margin
D. The angel between the basic and additional cavities should be 90°
E. All mentioned above

9. What types of instruments are used for necrectomy of the carious cavity during preparation?
A. Fissure burs
B. Smoother, fissure burs
C. Excavator, diamond round burs, probe
D. Round burs, excavator
E. Chisel, plugger, excavator

10. What angle between the floor and walls is the most correct for the tooth cavity preparation by Dr. Black?
A. 45°
B. 110°
C. 90°
D. 75°
E. The angle is not important

Practical Lesson № 7

Classification of filling materials, its peculiarities and indications for use

Aim of the lesson: to acquaint students with different types of dental materials, their classification. To teach students to choose the right filling materials depending on the clinical situation.

Actuality: rapid development and the production of new filling materials requires the dentist to have deep knowledge of the properties of different groups of filling materials and indications for their use.

Control of the initial level of knowledge:
1.Classification of filling materials
2. Characteristics of the main groups of filling materials

Content of the lesson

At the beginning of the lesson the teacher gives the definitions of " liners", bases and cements.

Liners are materials that are placed as thin coatings, and their main function is to provide a barrier against chemical irritation.

Base materials function as barriers against chemical irritation, provide thermal insulation, and resist forces applied during condensation of the restorative material.

Cavity varnishes are natural resins or synthetic resins dissolved in a solvent such ether or chloroform.

Cements are divided:

1. Zinc oxide-eugenol cement
2. Zinc phosphate cement
3. Polycarboxylate cement
4. Glass-ionomer cement

Glass-ionomer luting cements bond to tooth structures and release fluoride in amounts comparable to cements known to be anticariogenic. A primary disadvantage of these cements is the slowness with the ultimate properties are developed.

Dental amalgam fillings. Dental amalgam is a self-hardening mixture of silver-tin-copper alloy powder and liquid mercury and is sometimes referred to as silver fillings because of its color. It is often used as a filling material and replacement for broken teeth.

Advantages:

- Durable; long lasting;
- Wears well; holds up well to the forces of biting;
- Relatively inexpensive;
- Generally completed in one visit;
- Self-sealing; minimal-to-no shrinkage and resists leakage;
- Resistance to further decay is high, but can be difficult to find in early stages;
- Frequency of repair and replacement is low.

Disadvantages:

- Gray colored, not tooth colored;
- May darken as it corrodes; may stain over time;
- Requires removal of some healthy tooth;
- In larger amalgam fillings, the remaining tooth may weaken and fracture;
- Because metal can conducts hot and cold temperatures, there may be a temporary sensitivity to hot and cold;
- Contact with other metals may cause occasional, minute electrical flow.

Composite resin fillings. Composite fillings are a mixture of powered glass and plastic resin, sometimes referred to as white, plastic, or tooth-colored fillings. It is used for fillings, inlays and veneers or to repair portions of broken teeth.

Advantages:

- Strong and durable;
- Tooth colored;
- Single visit for fillings;
- Resist breaking;
- Maximum amount of tooth preserved;
- Small risk of leakage if bonded only to enamel;
- Does not corrode;
- Generally holds up well to the forces of biting depending on product used;
- Resistance to further decay is moderate and easy to find;
- Frequency of repair or replacement is low to moderate.

Disadvantages:

- Moderate occurrence of tooth sensivity; sensitive to dentist's method of application;
- Costs more than dental amalgam;
- Material shrinks when hardened and could lead to further decay and/or temperature sensivity;
- Requires more than one visit for inlays, veneers, and crowns;
- May wear faster than dental enamel;
- May leak over time when bonded beneath the layer of enamel.

Glass-ionomer cement is a self-hardening mixture of glass and organic acid. It is a tooth-colored and varies in translucency. Glass-ionomer is usually used for small fillings, liners and temporary restorations.

Advantages:

- Reasonably good esthetics;
- May provide some help against decay because it releases fluoride;
- Minimal amount of tooth needs to be removed and it bonds well to both the enamel and the dentin beneath the enamel;
- Material has low incidence of producing tooth sensivity;

- Usually completed in one dental visit.

Disadvantages:

- Cost is very similar to composite resin (which costs more than amalgam);
- Limited use because it is not recommended for biting surfaces in permanent teeth;
- As it ages, this material may become rough and could increase the accumulation of plaque and chance of periodontal disease;
- Does not wear well; tends to crack over time and can be dislodged.

Resin- Modified GICs is a mixture of glass and resin polymer and organic acid that hardens with exposure to a blue light used in dental office. It is tooth colored but more translucent than glass-ionomer cement. It is most often used for small fillings and liners.

Invention of resin-modified GIC was second approach to improving the mechanical properties of GICs focused on the matrix. Improvement has been achieved by grafting unsaturated carbon-carbon bonds onto the polyalkenoate backbone, by incorporating (di) methacrylate monomer (s) into the composition or by doing both. The presence of unsaturated carbon-carbon bonds enables the covalent crosslinking of the matrix via free radical polymerization reactions (chemically or light activated). A covalently crosslinked matrix significantly improves the mechanical properties of the set cements. These cements are well tolerated by the pulp, although some biocompatibility concerns have been raised because of the release of resin components (i.e., hydroxyethyl methacrylate, or HEMA). It has been proposed that these types of GICs be called resin-modified glass ionomer cements (RMGICs), although "resin-modified glass polyalkenoate cements" might have better described their structure. RMGICs are water based, an acid-base reaction is the main setting mechanism, they maintain the ability to bond to hard-tooth tissues via the carboxylic groups of the polyalkenoate component, and they have levels of fluoride release similar to GICs.

Advantages:

- Very good est hetics;
- May provide some help against decay because it releases fluoride;
- Minimal amount of tooth needs to be removed and it bonds well to both the enamel and the dentin beneath the enamel;
- Good for non-biting surfaces;
- May be used for short-term primary teeth restorations;
- May hold up better than glass-ionomer but not as well as composite;
- Good resistance to leakage;
- Material has low incidence of producing tooth sensitivity;
- Usually completed in one dental visit.

Disadvantages:

- Cost is very similar to composite resin (which costs more then amalgam);
- Limited use because it is not recommended to restore the biting surfaces of adults;
- Wears faster than composite and amalgam.

Glass-ionomer cements, resin-modified glass-ionomer cements and compomers – these materials have an increasingly important role to play in the management of carious lesions in Class I and Class V restorations because of their adhesive and fluoride-leaching properties.

Knowledge level control:

1. The anatomical features of tooth hard tissues in primary teeth
2. What stomatological instruments for filling do you know?
3. What features the restorative materials for primary teeth have to possess?
4. The anatomical features of tooth hard tissues in primary teeth.
5. What stomatological instruments for filling do you know?
6. What features the restorative materials for primary teeth have to possess?
7. The definition of liners.
8. The definition of bases.
9. Liners: composition and chemistry, properties, techniques and manipulations.
13. Bases: composition and chemistry, properties, techniques and manipulations.

14. What cements do you know?
12. Procedure for Luting (liners, bases, cements).
13. Glass ionomer cement: composition and chemistry, properties, techniques and manipulations.
14. Cements: composition and chemistry, properties, biologic properties, techniques and manipulations.
15. What are the particularities of the Class I amalgam restoration?
16. What are the particularities of the Class V amalgam restoration?
17. What are the particularities for glass-ionomer restorations?

Tests:

1. What kind of armamentarium is used for dental filling?
A. Plugger, smoother, spatula, glass slab
B. Probe, excavator
C. Amalgam trigger, tweezers
D. Excavator, smoother
E. Round bur, tweezers

2. There are such temporary filling materials:
A. Amalgam, glass-ionomer cements
B. Resin-based composite
C. Zinc phosphate-cement
D.Water dentin, dentine-paste, Zync-eugenol cement
E. ZOE- cement, glass-ionomer

3. What is the purpose of using of isolative liners?
A. To provide a barrier against chemical irritation
B. To provide a barrier against chemical irritation, provide thermal insulation
C. To resist forces applied during condensation of the restorative material
D. To restore the form of the tooth
E. For the root canal filling.

4. What is the purpose of using of the base materials?
A. To provide a barrier against chemical irritation
B. To provide a barrier against chemical irritation, provide thermal insulation
C. To resist forces applied during condensation of the restorative material
D. To restore the form of the tooth
E. To provide a barrier against chemical irritation, provide thermal insulation and resist forces applied during condensation of the restorative material

5. What is the definition of the cavity varnishes?
A. Materials that are placed as thin coatings for providing barrier against chemical irritations
B. Materials, that are placed to resist forces applied during condensation of the restorative material
C. Natural resins or synthetic resins dissolved in a solvent such as ether or chloroform
D. Self-hardening mixture of glass and organic acid
E. Materials that release fluoride

6. What kind of cements do you know?
A. ZOE (zinc oxide-eugenol), amalgam, water dentine
B. ZOE, zinc-phosphate, polycarboxylate, glass-ionomer
C. Gutta-percha, composites
D. Glass-ionomer cement, cavity varnishes
E. ZOE, dental-paste

7. What cement is known as anticariogenic?

A. Glass-ionomer cement
B. Zinc-phosphate cement
C. Water dentine, glass-ionomer
D. Silicate cements
E. Resin-based composite

8. What feature of the cement is known as anticariogenic?
A. Protection of the pulp from chemical agents
B. Isolation against thermal irritants
C. High level of adhesion to the tooth tissues
D. Release of fluoride
E. all answers are correct

9. What are advantages of the glass-ionomer cements?
A. High level of adhesion to the tooth tissues
B. High biocompatibility to the tooth tissues
C. Release of fluoride, low level of polymerization shrinkage
D. Coefficient of thermal expansion of the cement is close to the coefficient of thermal expansion of the tooth tissues
E. All answers are correct

10. What disadvantages of the glass-ionomer cements do you know?
A. Limited use because it is not recommended for biting surfaces in permanent teeth, material becomes rough with age
B. Low level of biocompatibility to the tooth tissues
C. Good esthetic features
D. Low level of adhesion to the tooth tissues
E. High level of polymerization shrinkage

Practical Lesson № 8

Filling of carious cavities of Class I, Class V in primary and permanent teeth with dental cements and amalgam

Aim of the lesson: to acquaint the students with dental cements and amalgam. To teach students to fill the caries cavities of classes I and V in the primary and permanent teeth.

Actuality: the development of a large number of dental materials requires the dentist to have a clear knowledge of their properties and impressions before use.

Control of the initial level of knowledge:
1. What dental cements do you know?
2. What cavities are classified in grades I and V after Blacke?
3. Properties of "ideal" filling material
4. What tools are needed to fill the carious cavities?

Content of the lesson
Method for glass-ionomer restorations:
1. Local anesthesia; rubber dam isolation should be used where possible;
1. The outline of the cavity should follow the extent of the carious lesion. There should be no extension for prevention;

2. Remove all soft caries using a slow bur and hand instruments. Be aware of the large pulp chamber as it is easy to expose the pulp of the primary molar;
3. Per-condition the dentine using 10% polyacrylic acid for 10 second, wash and dry;
4. When using encapsulated materials, operator should ensure that the capsules are compressed for at least 3 seconds to facilitate adequate mixing of the powder and liquid components, mix for 10 seconds, discard the first 3-4 mm of the mixed materials as this is often unsatisfactory, place the remainder directly into the cavity;
5. Once the relatively thick material has been placed into the cavity it is compressed with a ball burnisher – the use of a small amount of bonding agent prevents sticking to the instrument;
6. The final restoration must be protected from moisture contamination. This is best achieved by the placement of a thin layer of unfilled resin over the surface and polymerizing for the 20 seconds. In young children with behavior management problems, the use of Vaseline rather than unfilled resin may be appropriate;
7. The occlusion should be checked on removal of the rubber dam.

Knowledge level control:

1. Filling of the carious cavities of classes I and V after Blacks with glass ionomer cements.
2. Method of filling the carious cavities of classes I and V after Blacks with amalgams.
3. What are the positive and negative properties of glass ionomer cements?
4. What are the positive and negative properties of amalgam?
5. Indications for filling of carious cavities with amalgam.
6. Technique of preparation of amalgams.

Tests:

1. What instrument is used for carrying amalgam into a cavity:
A. Plugger
B. Smoothers
C. Forceps
D. Amalhamtregher

2.What instrument is used for carrying amalgam into a cavity:
A. Plugger
B. Smoothers
C. Forceps
D. Amalhamtregher

3. Which filling material is optimal for filling cavities Class II:
A. Compomer
B. Silver amalgam
C. The glass cements
D. Composite

4. After making and condensation of amalgam filling on seal surface what is formed?
A. Hamma2 phase
B. Gamma-phase
C. Not formed
D. Hamma1 phase

5. What seals properties are changed by tin-mercury compound (hamma2-phase)?
A. Increases strength
B. Decreases strength
C. Reduces turnover of amalgam
D. Increases corrosion resistance Increases corrosion resistance

6. Which of these materials is related to zinc-eugenol cement?
A. Infantid
B. Caryosan
C. Adhesor
D. Fritex
E. Caryosan

7.What is needed to achieve a tight interdental contact at filling cavities of Class II?
A. All listed above
B. Adapt the matrix
C. Fix matrix by wedge
D. Use a thin matrix

8. If the contact point is created correctly, then:
A. Partly remains
B. Matrix is hard taken out from the interdental gap
C. Generally is not taken out from the gap
D. Easy output

9. What type of adhesion to dental hard tissue has glassionomer cement?
A. Chemical
B. Physical
C. Mechanical
D. Combined (chemical-mechanical)
10. Adjacent cavities Class II (distal cavity tooth 26 and the medial cavity tooth 27) was filled by one portion of amalgam. What is a mistake:
A. Matrix is not used
B. Seals finishing Improper
C. Filling material selected improperly
D. Improper set of point contact

Practical Lesson № 9

Technique of filling of Class II restoration with dental cements and amalgam of primary and permanent teeth. Forming of the contact point

Aim of the lesson: To master the method of filling the carious cavities of the II class with dental amalgam. To teach the students the rules for restoring the contact point.

Actuality: the necessity of knowledge of the technique of filling the carious cavities of the II class with dental cements and amalgam in the primary and permanent teeth and the restoration of the contact point due to frequent medical errors and difficulty of execution

Control of the initial level of knowledge:
1. What cavities are classified in class II afrer Blacke?
2. What is a contact point?
3. What devices do you know for creation a contact point?
3. What groups of filling materials are used for filling the carious cavities of class II afrer Blacke?

Content of the lesson

At the beginning of class, the instructor emphasized that the main task for filling of cavities of class II Black is playing at full functions and forms of the tooth restoration of contact point. From the a rational fully spent filling cavities class II dependent prevent further development of the caries process and the restoration the contact point protects against injuries tooth-gingival papillae. When filling cavities class II preference should be given a silver amalgam, composite materials, glass ionomer cements and compomers. To fill the cavity Class II accounted for a significant masticatory load as the material for it to be first of all mechanically stable. Sylikophosphate cement (Sylidont) is used for filling Class II in primary molars and in permanent molars and premolars due to its high strength and durability. Duaring work with sylidontom it is necessary to use insulating pad. The total time for mixing cement 1 minute. The consistency of the mixture considered normal if the separation spatula if it is not followed by stretches and breaks, forming the teeth height of not more than 1 mm. The required amount of cement mixture is injected into the cavity mounted carious 1-2 portions and carefully condensed to the walls and bottom using condensor. Glass ionomer cements in class II the cavities of used only for primary molars. For the Class II cavities is indispensable silver amalgam. It has high hardness of, strength, maintains good contact points in places where there is high mechanical load. Therefore, it is the main material for stopping teeth side as temporary and permanent occlusion in children. During the formation of class II cavity must form an additional cavity on a masticatory surface. As the pad can be used zinc phosphate cement. Lining should repeat elements of main and auxiliary cavities throughout the period. When fillings the cavity of class II should be used matrytsetrymach and metallic matrix. There should also cervical adaptation of matrix using interdental wedge (wood). Prepared amalgam cavity made in several portions (initially small and then some more). The first portion thoroughly ground in cervical part of the main cavity of class II, the remaining portions of condensed as in the main and auxiliary in the cavity. After filling the cavity with a small excess an amalgam model anatomical shape of the tooth. After removal of the excess matrix amalgam surfaces removed from aproximal surface thin semilunar instrument and crumbs amalgam of the interdental spaces - by using dental floss. Consideration should be given to the students of composition and properties of composite materials. Students will be introduced to the peculiarities of filling cavities of class II with chemical and light curing materials.

Methods of application of light-curing composites materials involves a number of stages:

1. Anesthesia.
2. Professional hygiene.
3. Choice of colors of filling material.
4. Preparation cavity.
5. Etching of enamel and dentin (etching time is 30 seconds, including 15 second for dentinetching).
6. Flush etch gel water within approx 45-60 s.
7. Dry the cavity.
8. Add the primer (first portion of the primer should be applied into prepated cavity with a special brush and leave for 30 s, then applied a second layer of primer, slightly dried with air stream and polymerized 20s).
9. Application of adhesive (the adhesive should be applied with a brush on the surface of the enamel and dentin, dried and polymerized for 30 s. The modern adhesive systems consist of a single component with properties and the adhesive primer and at the same time. One-component adhesive systems used in the stage 2 (Etching tissues, causing adhesive system and polymerisation).
10. Adding composite material. The thickness of each layer of the composite should not exceed 1.5-2 mm.
11. Rebonding. This application enamel adhesive to seal formed and polymerized.
12. Polishing (use diamond burs with a thin coating, carbide finishing burs for aproximal surfaces using strips and flosses. The final polishing step is conducted using special polishing heads of various shapes for composites and polishing pastes. For the filling cavities class II composite materials used light-curing sealing method with the obligatory use of matrices and interdental blades.

It was proposed layered technique (sandwich) - double hardening technique using glass ionomer materials. Slight shrinkage glass ionomer materials ensures proper boundary adjacent to the gum wall and prevents and secondary caries.

Technique: proximal surface (Class II) composite resin restoration:

2. Prepare cavity as for amalgam (the enamel margin of the cavity may be beveled);
3. Line a cavity (glass-ionomer cement may be used as a base, using calcium hydroxide only to line very deep parts of the cavity);
4. Place a matrix (use a thin metal matrix material, contour it with a burnisher so that it contacts the adjacent tooth, and place a wedge at the cervical margin; alternatively, use a polyester matrix);
5. Etch the enamel at the margin of the cavity (with a cotton wool pledget, sponge pad or small brush, apply 30-50% phosphoric acid to the enamel of the cavity walls and margin; after 1-1,5 minutes, wash for 15 seconds and dry for 30 seconds);
6. Apply unfilled resin to the etched enamel (use a small brush to apply unfilled resin (bonding agent) to the etched enamel; use a dentine adhesive; allow resin to polymerize, or polymerize with a light source, depending on the type of resin used);
7. Insert composite resin restorative material (if using a light-sensitive material polymerize each increment before adding further material);
8. Remove the matrix, trim excess and polish.

Technique: proximal surface (Class II) glass-ionomer restoration:

1. Prepare a cavity (although glass-ionomer cement adheres to enamel and dentin, it is better to provide mechanical retention within the cavity);
2. Line the cavity only if it is deep (place quick-setting calcium hydroxide over the deep part of the cavity only);
3. Place a matrix;
4. Clean the cavity walls (the surface of enamel and dentin cut during cavity preparation is covered by fine debris (the"smear layer"), which is removed by acid cleanser, enhancing adhesion; apply the conditioning solution with a cotton wool pledget to the cavity floor and walls for 10-15 seconds, followed by washing with water and light drying);
5. Insert the glass-ionomer cement;
6. Remove the matrix and trim excess (after the material has set, remove the matrix and trim excess with a sharp carver; apply further varnish or unfilled resin over newly-exposed material);
7. Polish the restoration.

The knowledge level control:

1. The anatomical features of tooth hard tissues in primary teeth.
2. What stomatological instruments for filling do you know?
3. What features the restorative materials for primary teeth have to possess?
4. What are the particularities of the Class II amalgam restoration?
5. Describe the technique of the Class II for composite resin restoration.
6. Describe the technique of the Class II for glass-ionomer restorations.

Tests:

1. What carious cavities belong to the Class II by Dr. Black?

A. Lesions occur in fissures and pits of molars and bicuspids
B. Cavities occur on the proximal surfaces of posterior teeth
C. Lesions afflict the proximal surfaces of anterior teeth without including the incisal angle.
D. Lesions afflict the proximal surfaces of anterior teeth with involving the incisal angle
E. Lesion localized on the cervical surface of all groups of teeth.

2. What surfaces of the tooth belong to the proximal ones?

A. Masticatory
B. Mesial or distal surfaces of the tooth which are close to adjacent teeth
C. Cervical region

D. Lingual area of the tooth
E. Vestibular region of the tooth

3. What is the main goal that should be achieved by dentist during the filling of Class II carious lesion?
A. To choose the proper filling material
B. To avoid the gum injury
C. To restore the structure and proper function of the tooth due to forming tight contact point between the teeth and forming correct occlusal surface
D. To achieve a good esthetic result
E. All answers are incorrect

4. What is the main demand to the choice of filling material in Class II cavities?
A. Mechanical strength of the material because of huge occlusal loading on the tooth
B. High adhesion and polishing properties
C. Esthetic demand
D. Roentgen contrast
E. Biocompatibility

5. What do we need for formation of the tight interdental contact point during filling Class II cavities?
A. Using of thin interdental matrix
B. Using of wedges
C. Using of rings for better matrix fixation
D. Using of pluggers
E. All mentioned above

6. What type of matrices should be used when working with amalgam?
A. Metal-firm
B. Mylar matrix, can light-cure through
C. Plastic-rigid, light-cure through
D. Special matrix for deep subgingival cavities
E. Copper bands matrix

7. What is the purpose of wedges using?
A. To allow firm adaptation of matrix to tooth
B. To fix the rubber dam
C. To retain the restorative material in the cavity
D. To provide external contour of restoration
E. To avoid interdental injury of the papilla

8. What is the purpose of rubber dam using?
A. To achieve better adhesion of the material
B. For premedication
C. For adequate control of moisture during filling
D. To provide good esthetic and durable restoration
E. Just modern demand

9. What is the main purpose of the additional cavity formation?
A. Better adhesion of the filling material to the tooth structure
B. For the better filling fixation and even distribution of chewing pressure on the tooth
C. For the better distribution of chewing pressure on the tooth
D. To avoid pulp cavity perforation
E. To avoid injury of the gingival margin

10. What surface of the tooth should be used for the additional cavity formation?
A. Cervical surface
B. Occlusal surface
C. Proximal surface
D. Distal surface
E. The additional cavity is not necessary

Practical Lesson № 10

Resin based composites and compomers. Technique of filling of Class I and V carious cavities of primary and permanent teeth

Aim of the lesson: To familiarizethe students with various composite filling materials and compoments. To master the technique of filling of carious cavities of classes I and V in the primary and permanent teeth on phantoms.

Actuality: the knowledge and possession of the technique of filling of the carious cavities of classes I and V of the primary and permanent teeth with compomers and composite materials is necessary given the wide arsenal of modern compomers and composite materials

Control of the initial level of knowledge:
1.Classification of composite materials
2. Properties of composite materials and compomers
3. Indications for the use of composite materials.
4. Indications for the use of compomers

Content of the lesson

Resin-based composite resins and polyacid-modified resin-based composites (compomers) have become popular for the restoration of primary anterior and posterior teeth. In some European countries, resin-based composites or glass-ionomers are the materials of choice for primary teeth because of the controversy over dental amalgam and its alleged adverse health effects resulting from the release of mercury, although a clear correlation between amalgam restorations and health has not been determined. Another reason for the worldwide increased use of resin-based composites and glass-ionomers in pediatric dentistry could be attributed to the growing demand from parents to provide esthetic restorations to their children. More conservative preparations can be performed maintaining more tooth structure because of the adhesive properties of the composites and compomers. The most conservative treatment planning and meticulous care in the placement of the resin-based composites and compomers would produce long-term satisfactory results. These restorations should be placed in patients with low-to-moderate caries risk, and after placement the restorations should be monitored carefully to avoid complications mainly produced by recurrent caries and wear. Dental materials science, to paraphrase a definition of materials science,[1] is primarily concerned with the search for basic knowledge about internal structure, properties and processing of dental materials. The aim of this paper is to analyze from a dental materials science point of view a recently introduced dental material marketed as “compomer”. To facilitate the discussion, a brief review of dental composites and polyalkenoate cements, in particular glass-polyalkenoate cements or glass ionomer cements (GICs), is necessary.

Compomers. Shortly after the introduction of RMGICs, “compomers” were introduced to the market. They were marketed as a new class of dental materials that would provide the combined benefits of composites (the “comp” in their name) and glass ionomers (“omer”). These materials have two main constituents: dimethacrylate monomer(s) with two carboxylic groups present in their structure and filler that is similar to the ion-leachable glass present in GICs. The ratio of carboxylic

groups to backbone carbon atoms is approximately 1:8. There is no water in the composition of these materials, and the ion-leachable glass is partially silanized to ensure some bonding with the matrix. These materials set via a free radical polymerization reaction, do not have the ability to bond to hard tooth tissues, and have significantly lower levels of fluoride release than GICs. Although low, the level of fluoride release has been reported to last at least 300 days. The delayed (post-cure and post-water-sorption) acid-base reaction between sparse carboxylic groups and areas of filler not contaminated by the silane coupling agents is speculative and is probably insignificant to the overall properties of these materials. Based on their structure and properties, these materials belong to the class of dental composites. Often, they have been erroneously referred to as "hybrid glass ionomers", "light-cured GICs" or "resin-modified glass ionomers along with the "genuine" resin-modified GICs. The proposed nomenclature for these materials as polyacid-modified composite resins, a nomenclature that is widely used in the literature, may over-emphasize a structural characteristic of no or little consequence. Considering the low volume fraction filler and the incomplete silanization of the filler, it could be postulated that they are inferior composites. Both in vitro and in vivo investigations have confirmed this expectation. Lower flexural modulus of elasticity, compressive strength, flexural strength fracture toughness and hardness, along with significantly higher wear rates compared to clinically proven hybrid composites, have been reported for these materials. Their clinical performance received mixed reviews in in vivo clinical trials. With the exception of concerns about the release of HEMA from these materials, no other biocompatibility issues have been associated with their usage. Their applicability as orthodontic adhesives, amalgam bonding systems and veterinary restorative materials has also been reported. Constant re-formulations of these types of materials may eventually lead to them being comparable or even superior to existing composites, but, as long as they do not set via an acid-base reaction and do not bond to hard-tooth tissues, they cannot and should not be classified with GICs. They are, after all, just another dental composite.

The knowledge level control:

1. The anatomical features of tooth hard tissues of the primary teeth.
2. What main and additional dental instruments for placement of the filling for the primary and permanent teeth with Class I and V do you know?
3. What features of the Claass V restauration do you know?
4. Describe the technique of the Class I for composite resin restoration.
5. Describe the technique of the Class V for compomer restorations.

Tests:

1. What carious cavities are referred to the Class I by Dr. Black classification?
A. Lesions occur in fissures and pits of molars and bicuspids
B. Cavities occur on the proximal surfaces of posterior teeth
C. Lesions afflict the proximal surfaces of anterior teeth without including the incisal angle.
D. Lesions afflict the proximal surfaces of anterior teeth with involving the incisal angle
E. Lesion localized on the cervical surface of all groups of teeth.

2. What carious cavities are referred to the Class V by Dr. Black classification?
A. Lesions occur in fissures and pits of molars and bicuspids
B. cavities occur on the proximal surfaces of posterior teeth
C. Lesions afflict the proximal surfaces of anterior teeth without including the incisal angle.
D. Lesions afflict the proximal surfaces of anterior teeth with involving the incisal angle
E. Lesions are localized on the cervical surfaces of all groups of teeth.

3. What materials are placed layer by layer out of listed above:
A. Glass-ionomer cement
B. Amalgam
C. Composites
D. ZOE cements

E. Phosphate cement

4. What is the goal of multilayered placement of these materials?
A. For better filling fixation to the tooth tissues
B. For better marginal adaptation of the filling
C. To reduce the internal stress into the filling
D. For better esthetic appearance
E. All answers are incorrect

5. During the filling of the 36 tooth with Class I cavity the doctor (after etching and bonding of the cavity) put composite material of one portion and polymerize it. What is the mistake of the doctor?
A. Incorrect polymerization
B. Incorrect bonding
C. Incorrect placement of the material by one portion
D. All procedures are correct
E. Incorrect etching

6. What are the main features of the compomers?
A. Releasing of the fluoride
B. Good adhesion to the hard structures of the tooth even without primary etching
C. Good esthetic
D. The possibility to use compomers in the primary dentition as well as in the immature permanent teeth
E. All mentioned above

7. When the composite resins are used?
A. In primary teeth in the stabilization stage
B. In permanent dentition with complete root formation
C. In permanent teeth with unformed apexes of the root
D. In primary teeth in the stage of root resorption
E. In both dentitions

8. When the compomers are used?
A. In primary teeth in the stabilization stage
B. In permanent dentition with complete root formation
C. In permanent teeth with unformed apexes of the root
D. In primary teeth in the stage of root resorption
E. In the primary dentition as well as in the immature and mature permanent teeth.

9. What is the size of particles in the traditional fine particle (macrofilled) composites?
A. 1-30 μm
B. 0, 1-0, 04 μm
C. 0, 04-10 μm
D. 20-40 μm
E. 1-50 μm

10. What is the size of particles in the traditional microfilled composites?
A. 1-30 μm
B. 0, 1-0, 04 μm
C. 0, 04-10 μm
D. 20-40 μm
E. 1-50 μm

Practical Lesson № 11

Technique of filling of Class III and IV carious cavities of primary and permanent teeth in children. Restoration of the form, color of the tooth and the contact point

Aim of the lesson: to learn the indications, contraindications and methods of applying different chemical composition of filling materials in III and IV class cavities

Actuality: a large arsenal of filling materials belonging to different groups, requires knowledge of the features of filling equipment with different materials and indications for their use, depending on the localization of thecarious cavities and anatomical form of the tooth

Control of the initial level of knowledge:

1 Which cavities are reffered to III and IV class cavities.
2. What filling materials can be used for filling the carious cavities of the III and IV classes after Blake
3. Stages of filling of the carious cavities with composite materials
4. Requirements for filling materials for the primary teeth

Content of the lesson

Plastic restorations for Class III and Class IV are used intracoronally. Materials include resin composite, glass-ionomer cements.

Linings. Uses:

- Puplal protection (against thermal irritation in metallic restoration or leaching of toxic materials in non-metallic restorations;
- Structural function (used to improve cavity design, e.g. to create a flat floor);
- Therapeutic function (in the deep carious lesion as an indirect or direct pulp cap);
- Clinical tips (the deeper the cavity, the greater the need to insert lining for pulp protection; lining over dentine should not extend to enamelodentinal junction or cavity margin).

Matrices:

- Functions of matrices (retain restorative material in cavity during placement; allow close adaptation of restorative material to cervical and axial margins; ensure contact area and provides external contour of restoration);
- Types of matrices: metal – firm, used for amalgam; mylar – easily mouldable and can light-cure through – used for resin composite; plastic – rigid, can light-cure through – used for V Class cavity; in deep subgingival cavities use of special matrices such as tofflemire or automatrix or copper bands often achieve better contact points and marginal adaptation.

Wedges:

- Allow firm adaptation of matrix to tooth, available in a variety of sizes; made of wood or plastic, some permit light curing via wedge.

Moisture control:

- good moisture control is essential for placement of plastic restorations: rubber dam should be used; in the absence of rubber dam, moisture control may be assisted by use of saliva ejectors, cotton-wool rolls and sponges.

Composite is the material of choice for the restoration of anterior teeth. The use of matrix with composite resins will provide a good aesthetic and durable restoration.

Dental Composites

A composite is "a material system composed of a mixture or combination of two or more micro- or macro-constituents that differ in form and chemical composition and [that] are essentially insoluble in each other."[1] To generalize and simplify, composites have two main constituents: the matrix and the filler. The matrix forms a network that provides the structural skeleton of the composite, and the filler imparts its mechanical properties onto those of the composite.

The filler has to be intimately bonded to the matrix to fulfil its role. Based on their dominant dimension (length, width, thickness), fillers can be classified as spherical (no dominant dimension), fibres (length is dominant) or flakes (length and width are dominant). The percentage of volume occupied by the filler (Vf [volume fraction filler]), the orientation of fibre- type fillers and the aspect ratio of flake-type fillers are crucial in determining the properties of a composite. The effect of V_f of spherical fillers on the modulus, for instance, follows an exponential curve, which becomes significant beyond 60% .This relationship has been used as the rationale in a proposal for the classification of dental composites. Metals, ceramics and polymers can form either the matrix or the filler. Pigments, antioxidants, inhibitors, preservatives and antimicrobials are some other possible minor constituents of composites. Dental composites are polymer-ceramic materials in which methacrylate and dimethacrylate monomers polymerize to form the matrix and glasses, ceramics or glass-ceramics are incorporated as spherical fillers. Among the most commonly used dimethacrylate monomers are 2,2-bis[4-(2-hydroxy-3-methacryloyloxypropoxy)phenyl]propane (BIS-GMA), 1,6-bis (urethane-ethyglycol-methacrylate)2,4,4-trimethylhexane (UEDMA) and triethyleneglycol dimethacrylate (TEGDMA). To ensure bonding between the filler and the matrix, the filler particles are coated with silane-coupling agents that contain a methacrylic group able to co-polymerize with the matrix-forming dimethacrylate monomers and functional groups able to interact with the filler. The quality and extent of the silane coating significantly affect the properties of composites. The best available hybrid composites have mechanical properties that are far from ideal for a restorative material. An ideal restorative material should have properties that match those of the hard tissue that it is supposed to replace. From a structural point of view, matching the modulus of elasticity is the most important consideration. Matching the compressive strength, fracture toughness, coefficient of thermal expansion and other properties are secondary considerations. The modulus of dentin is approximately 18 GPa and that of enamel is approximately 80 GPa; the modulus of hybrid and posterior composites (including laboratory-processed ones) ranges from 15 to 25 GPa. Hybrid and posterior composites have adequate stiffness to replace dentin but are far from approaching the stiffness required to replace enamel. The stiffest dental composite has the ability to "flex" three times more than enamel, a fact that clearly contradicts the arguments of those who advocate the use of more flexible composite.

Method:

1. Local anesthesia and rubber-dam isolation should be used if possible. Alternatively, because of age and poor cooperation of young children, the restorative work may be completed under general anesthesia.
2. Carry out the correct preparation.
3. Matrix application and wedging should be done using ¾ matrix material (thin T-band material works well). The matrix material may be held by simple finger pressure from the labial. Wedging may be from labial if more accessible).
4. Protect the exposed dentine with glass-ionomer lining cement.
5. Etch the enamel for 20 seconds, wash and dry.
6. Apply a then layer of bonding resin and cure for 20 seconds and ensure all surfaces are bonded equally.
7. Fill cavity with the appropriate shade of composite and seat with gentle, even, pressure, allowing excess to exit freely. The use of small wedges may be helpful in avoiding interproximal excess.
8. Light-cure each aspect (labially, incisally and palatally) equally.

9. Remove the matrix gently and adjust form and finish with either composite finishing burs or abrasive discs.
10. Check occlusion once the rubber dam is removed.

Pinned restorations:

- Dentine pins provide additional retention for a restoration;
- Use (additional retention for fractured cusps, crown cores, fractured incisal edges of anterior teeth, pinlay);
- Types of pins (threaded – cuts a thread in a slightly smaller hole in dentine; friction – roughened pin placed in an undersized hole and retained due to dentine elasticity; roughened – cemented into a slightly oversized hole)

Knowledge level control:

1. Describe the technique of the Class III for composite resin restoration.
2. Describe the technique of the Class IV for composite resin restoration.
3. Describe the technique of the Class III for glass-ionomer restorations.
4. Describe the technique of the Class IV for glass-ionomer restoration.
5. What are the main principles of Class III cavity preparation?
6. What are the main principles of Class VI cavity preparation?
7. What stomatological instruments for filling do you need for Class III and IV cavity preparation?
8. What features of the restorative materials for primary teeth have to possess?

Tests:

1. The optimal ratio of the powder and liquid filling of phosphate cements is:
A. 4:1
B. 3:1
C. 2:2
D. 3:2

2. The optimal temperature for making phosphate cements is:
A. 20-22 ° C
B. 24-26 ° C
C. 18-20 ° C
D. 28-30 ° C

3. What properties of phosphate cement would change drastically if the thick liquid mixture add:
A. Will increase strength
B. It becomes more plastic
C. Curing time increase
D. Strength will decrease

4. Consistency of phosphate cement mixture considered normal if it:
A. Not stretches and breaks forming notches (1 mm)
B. Do not detach from the spatula
C. Not reaching for a spatula
D. It remains on the stage

5. What instrument is used for carrying amalgam into a cavity:
A. Smoothers
B. Plugger
C. Amalhamtregher
D. Forceps

6. Which filling material is optimal for filling cavities Class II:
A. Silver amalgam

B. Composite
C. The glass cements
D. Compomer

7. After making and condensation of amalgam filling on seal surface what is formed?
A. Hamma2 phase
B. Gamma-phase
C. Hamma1 phase
D. Not formed

8. What seals properties are changed by tin-mercury compound (hamma2-phase)?
A. Increases corrosion resistance
B. Increases strength
C. Reduces turnover of amalgam
D. Decreases strength

9. High hardness and solidity, plasticity, resistance in the oral fluid, bactericidal action are characteristics of
A. Compomer
B. Amalgam
C. Silicophosphate cements
D. Glass-Ionomer cements
10. Which of silicophosphate cements can be used without liners:
A. Fritex
B. Sylidont
C. Beladont
D. Infantid

Practical Lesson № 12

Technique of the instrumental and medicamental treatment of root canals of primary and permanent teeth with unformed roots. Modern endodontic instruments: types, indications, choice

Aim of the lesson: to teach the students the main stages of endodontic treatment of the primary and permanent teeth. General principles, the choice of tools. To acquaint students with the technique of instrumental and medicamental treatment of root canals of the primary and permanent teeth with unformed roots.

Actuality: the student must know the modern endodontic tool kit, its purpose, the various techniques of instrumental treatment of root canals in the primary and unformed permanent teeth and be able to use them depending on the clinical situation.

Control of the initial level of knowledge:
1. What is an endodontist?
2. Anatomy of the root system in various anatomical groups of the primary and permanent teeth
2.The main techniques of instrumental processing of the root cannals
3. Stages and timing of formation of the roots of the primary and permanent teeth.

Content of the lesson

Differences between primary and permanent teeth:
Crown (primary tooth):

- Short clinical crown;
- Narrow occlusal table;
- Cervical constriction;
- Thinner layer of enamel and dentin;
- Broad flat contacts;
- Enamel rods in gingival third extend occlusally from DEJ.

Root (primary tooth):
- Roots of anterior teeth are narrower mesiodistally;
- Compared to their crowns, roots are longer and more slender;
- Roots of posterior teeth flare more as they approach the apex.

Pulp (primary tooth):
- Larger pulp in relation to the crown;
- Pulp horns are closer to the outer surface;
- Mesial pulp horn extends closer to the surface than the distal pulp horn;
- Mandibular pulp chamber are larger than maxillary;
- The form of the pulp chamber follows the surface of the tooth;
- There is a pulp horn under every cusp.

The objectives of root canal preparation are to:
1. Remove all organic debris from the root canal system;
2. Eliminate bacteria from the root canal;
3. Shape the canal so that it can be obturated with a root filling material.

The principles of the step back technique should be used for the preparation of all root canals. There are three stages:

Stage one. Establishing apical stop. Once the working length has been measured filing the canal may be started. The aim of filing is to remove all the irregularities from the walls of the canal and leave them smooth and cone shaped. The file is introduced gently to the correct length using a small contra-rotating movement. A planning action is used, pressing against the full length of the wall and gradually moving clockwise around the circumference of the canal. All instruments inserted into canal should be marked at the correct length with a rubber stop or marking paste. The canal is fine so the size 10 is first introduced into the canal to the full working length and filing commenced. A size 15 is then used. When this feels loose at the working length the size 10 is reintroduced to remove any accumulated debris. After each increase in size of instrument the previous size is inserted into the canal to prevent the canal from becoming blocked. The first stage in completed with the formation of an apical stop.

Stage two. Stepping back. Each larger instrument is inserted 1 mm less into the canal. Recapitulation is carried out between ach increase in instrument size by inserting the largest instrument size used in stage one to the full working length.

Stage three. Completion of preparation. A suitable sized Gates Glidden bur is used to complete the coronal taper.

Endodontic instruments and accessories often are prepared in sterile packs. A basic instrument setup can be established for endodontic procedures. The standardized setup can be used during each phase of treatment.

Instrument pack contains the basic instruments, which should be available and sterile for root canal treatment. The lack contains:
- Pair of artery forceps – to hold X-ray films in the mouth
- Sterile cotton wool pledgets and rolls
- Font surface mirror
- Endo locking tweezers
- Long shank excavator
- Amalgam plugger
- Flat plastic
- Canal probe
- Metal ruler

Broaches. A root canal broach is usually one of the first instruments used in the pulp canal during endodontic treatment. Broaches are thin, flexible, usually tapered and pointed, smooth or with series of sharply pointed barbed projections curving backward and obliquely. The identification symbol of barbed broaches is an eight-pointed star formed by the barbs. Smooth broaches can be used as explorers to get the feel of the canal. A barbed broach is used primarily for the removal of intact pulp tissue from large canals. The broach is introduced slowly into the root canal until gentle contact with the canal walls is made. It is rotated 360 degrees in either a clockwise or counterclockwise manner to entangle the pulpal tissue in the protruding barbs. It is then withdrawn directly from the root canal. If successful, the entire pulp comes with it. Because these instrument are fragile and prone to breakage, exercise great care in their use.

Reamers. Root canal reamers are used to enlarge the pulp canal after broaches have been used. Reamers may be used with a reaming action (rotary cutting) or a filing action (scrapping or pulling stroke). Reamers are usually tapered and pointed, with spiral cutting edges. Since the cutting edges of reamers are father apart then those found on files, reamers are more flexible than files. This same distance between the cutting edges causes reamers to cut slower than files. Reamers can also be used to remove old, softened gutta-percha filling, or as a paste carrier to place cement near the apex. Reamers are available in many sizes beginning with size 10 and continuing in intervals of 5 to size 60. Beginning with size 60, they are also available in intervals of 10 through size 140.The dentist may use several reamers in one operation, usually beginning with a relatively small size, then the next larger size each time the canal has been reamed to the desired diameter.

Files. Root canal files normally are used after the broaches and reamers. The root canal files look much like those the reamers. However, the file threads or cutting edges are much finer and closer together. Files come in two different types (H and K types) and are different in terms of physical properties, such as flexibility, resistance to fracture in rotation, and method of manufacture. The designation of ‘K-type” or “H-type” is a generic classification based on a manufacturing process and does not apply to any single design or line of instruments. Numerical size designations and color-coding are the same for both file type. Sizes begin with size 8 and continue through size 140. Files come in different lengths, including 19mm, 21mm, 25mm, and 31mm.

K-type. The K-type is tapered and pointed, with tight spiral cutting edges arranged so that the cutting occurs on either a pushing or pulling stroke. They are used to enlarge the root canal by a rotary cutting or abrasive action. When pulling the instrument out of the tooth, the cutting edges scrape against the wall, gouging and removing dentin in a filing action.

Hedstroem file. The instruments are machined from a round tapered blank. A spiral groove is cut into shank, producing a sharp blade. Because of the angle of the blade the hedstroem file should only be used with a filing action. If a rotary movement is used and the blades engage the dentin there is a danger of the instrument fracturing.

Spiral root canal fillers are used in a standard handpiece. The size selected must fit loosely in the canal and should not be used around curves in the canal.

Burs. There are several burs, which may be required for root canal treatment:

- Small standard round bur used occasionally to remove calcified deposits over the entrance to a canal in the pulp chamber floor;
- 16 mm bur for the floor of the pulp chamber. This bur has a shank 3mm longer than the standard bur;
- Long shank round bur overall length 23 mm;
- Goose neck round bur. Both this and long shank bur are used to locate a partially sclerosed canal. The Goose neck bur has the advantage, because of its extended narrow shank, of not being deflected by the wall of the axis cavity;
- Peeso reamer. This engine driven instrument has a sharp point and presents a real danger of perforating unless great care is used;
- Gates Glidden. Both the Gates Glidden and Peeso instruments are used to prepare post holes after the root treatment is complete and to taper the coronal part of the canal during root canal preparation

Knowledge level control:

1. Describe the step back technique.
2. Rules for access cavities.
3. What are the general differences between primary and permanent teeth?
4. What are the main groups of endodontic instruments?

Tests:

1. What specialist performs the root canal therapy?
A. Prosthodontist
B. Implantologist
C. Endodontist
D. Periodontist

2. The dental material which is the most commonly used for the pulp capping is:
A. Amalgam
B. Zinc phosphate
C. Calcium hydroxide
D. Glass ionomer

3. What portion of the pulp is removed during pulpotomy?
A. Coronal portion
B. Root portion
C. Complete pulp
D. Only the infected portion

4. What portion of the pulp is removed during pulpectomy?
A. Coronal portion
B. Root portion
C. Complete pulp
D. Only the infected portion

5. What instrument has tiny projections and is used for removing of the pulp tissue?
A. File
B. Broach
C. Reamer
D. Pesso-file

6. What type of the file is best suited for the canal enlargement?
A. Broach
B. Reamer
C. Pesso
D. Hedstrom

7. A rubber stop is placed on a file to:
A. Prevent perforation
B. Maintain the correct measurement of the canal
C. Identify the file
D. A and B

8. Which of the following is used to enlarge, smooth, and shape the root canal?
A. Endodontic file
B. Barbed broach
C. Endodontic plugger
D. Endodontic spreader

9. Which of the following is used to the lateral condensation of gutta percha in the root canal?
A. Endodontic file
B. Barbed broach
C. Endodontic plugger
D. Endodontic spreader

10. Which of the following is used for the obturation of the root canal?
A. Endodontic file
B. Barbed broach
C. Lentulo
D. Endodontic reamer

Practical Lesson № 13

Filling materials for the temporary and permanent obturation of root canals. Technique of filling of root canals of primary teeth

Aim of the lesson: filling materials for the primary and permanent obturation of root canals. The technique of filling the root canals in the primary teeth.

To learn the technique of filling of the root canals of the primary teeth in different childhood periods and to get acquainted with the filling materials for root canal obturation.

Actuality: the knowledge of filling materials for root canals for primary and unformed permanent teeth will allow to correctly select the material for treatment depending on the disease of the tooth and the stage of development of its roots.

Control of the initial level of knowledge:

1.Classification of filling materials for obturation of root canals.
2. Requirements for filling materials for root canals of the primary teeth.
3. Criteria of high-quality obturation of root canals.
4. Instruments for obturation of root canals

Content of the lesson

For the quality root canal obturation it is necessary to an adequate instrumental and medicamental processing. The root canal should be obturated throughout its working length. Students should know the features of endodontic treatment of teeth in children and, in particular, criteria of choice for filling materials for obturation of root canals. Filling materials for root canal obturation are divided into next group:

1. The temporary filling materials.
2. Paste.
3. Hard root fillings.

The materials for root fillings must fulfill the following requirements:

1. To be easily inserted into root canal
2. 2. To have consistency, which allows you to fill the channel along its entire length
3. To have good adhesion to the walls of of the root canal
4. Do not shrink
5. Be impervious to the tissue fluid tight obturuvaty channel.
6. Do not to dissolve in the root canal
7. Do not irritate the periodontal tissues
8. To promote the regeneration of periodontal tissue

9. To have anti-inflammatory effects
10. To have bactericidal and bacteriostatic properties
11. To be radio-opaque
12. To be safe to periapical tissues

The materials for root canal obturation of temporary teeth should also meet additional requirements: be non-toxic to permanent tooth germ on and to dissolve along with temporary tooth root during its resorption. Students should know the classification of materials for root canals of teeth, materials included in each classification group, to be able to choose the filling material, which should be used for root canal obturation of temporary and permanent teeth in children, depending on the diagnosis, stage of tooth root formation and age.

Filling materials for root canal obturation of divided into:

1. Zinc - phosphate cements
2. Zink-oxide-eugenol cements
3. Glass ionomer cements
4. Pastes based on zinc oxide eugenol, thymol, paraformaldehyde
5. Paste with calcium hydroxide
6. Paste (sealants) based on epoxy resins
7. Materials based on resorcinol – formalin
8. Pins, which are divided into hard (silver, plastic) and plastic (gutta-percha)

The teacher and students consider the properties, advantages, disadvantages, work rules and indications for the use of materials for root canal obturation of each classification group. For the root canal teeth absolutely do not use plastic hardening materials and solid pins. Students should know that filling root canal teeth that have not yet completed their development, it is necessary to use toothpaste with calcium hydroxide materials based on resorcinol - formalin not use.

For the root canal teeth naychyastishe use tsynkoksydevhenolnu paste yodoformnu paste materials based on calcium hydroxide. The materials for root canals in temporary teeth should be non-toxic to the rudiments of permanent teeth and dissolve at the root.

Sealing of root canals starts with entering of liquid paste on the walls of root canals, then used of plager introduce material more dense condensation. Also lentulo are used for condensation of obturative material paper pin are used.

Knowledge level control:

1. What instruments we need for endodontic preparation of root canal?
2. What irritating solutions do you know?
3. Classification of filling materials for obturation of root canal.
4. What cement are used for root canal obturation.
5. What pastes for root fillings do you know?
6. What are the indications for the use of gutta-percha pins.
7. What are the basic requirements for filling materials for root canal obturation.
8. Features of filling the primary teeth, depending on the stage of root development.

Tests:

1. In what case is it expedient to use the impregnation method of root canal treatment of the permanent teeth?

A. Before the resection of the root apex
B. In case of the wide root canals
C. In case of the obliterate root canals
D .During roots re-treatment

2. Specify possible reason of root canal refilling:

A. Wrong choice of filling material
B. Wrong determine of the working length
C. Wrong choice of filling technique
D .Wrong choice of the instrument for obturation

3. One of the lacks of the resorcin paste is:
A. Painting of the tooth tissue into the red color
B. Resorption
C. Porosity
D. Painting of the tooth tissue in blue color

4. Master-point is the:
A. Main gutta percha point
B. Additional gutta percha point
C. Plugger
D. Spreader

5. During the canal obturation the size of the master-point must be:
A. The same as the size of the apical master-file
B. Longer than master-file on 1 mm
C. Shorter than master-file on 1 mm
D. Shorter than master-file on 1.5 mm

6. During the lateral condensation it is necessary, that sealer will fill
A. The root canal on 1\3of its length
B. The root canal on full length
C. Covered the walls of root canal
D. A root-canal on 2\3 of its length

7. Name one of the positive properties of the epoxy resin materials:
A. Antibacterial action
B. Does not resolve in the root canal
C. Long working time
D. Easy refilling

8. What material from the transferred below belong to the group of epoxy resin?
A. Iodent
B. AH
C. Z\E pasta
D. Tempophore

9. What material from the transferred ones does not belong to the group of epoxy resins?
A. Iodent
B. AH
C. AH 26
D. Diaket

10. What material is used for the filling of the root canals of the temporary teeth?
A. Iodent
B. AH
C. AH 26
D. Diaket

Practical Lesson № 14

Technique of filling of root canals of permanent teeth at different stages of formation. The concept of apexogenesis and apexification

Aim of the lesson: to study the main groups of materials for root fillings and the main stages of root canal filling in the permanent teeth with unformed root. To learn with students the concept of apexogenesis and apexification.

Actuality: the method of apexogenesis and apexification is one of the most difficult in pediatric dentistry and endodontics in particular, therefore its study is very important for students.

Control of the initial level of knowledge:

1. What is "root filling"?
2. With the help of which toolkit introduce a helper in the root canal.
3.Roentgenological control of quality of obturation of the root canal, multiplicity of X-ray images.

Content of the lesson

At the beginning of the lesson teacher underline that after adequate root canal preparation and medication and its drying, the root canal cavity must be obturated up to the apex by root canal filling.

The objectives of irrigation - the important part of root canal treatment are:

- Lubrication of root canal instruments.
- Dissolution of organic debris.
- Flushing out of inorganic debris.
- Elimination of microorganisms.

The irritating solutions recommended are:

- Sterile water;
- Saline;
- Sodium hypochlorite.

Filling materials for root filling must:

- Easy introduces into root canal;
- Fill the root canal along all its length;
- Do not decrease in volume during the process of hardening;
- Do not resorp in root canal;
- Be defended from tissue liquid;
- Do not harm the periodontium tissues;
- Stimulate the processes of regeneration of periodontium tissues;
- Have antiseptic features;
- Does not color the tooth;
- Be visible in X-ray.

All filling materials for root filling on their physical and chemical features are divided into three groups:

I – plastic, which are not hardening;

II – plastic, which are hardening;

III – hard (points).

A wide variety of root canal sealers is available. The purpose of a sealer is to fill the minute spaces, which remain between the filler and walls of root canal. Sealers may be broadly classified according to their composition: eugenol, non-eugenol, and medicated. Eugenol-containing cements form the group most widely accepted. Basically the group may sub-divide into those that contain silver and those that are silver free. The inclusion of silver in the sealer has been criticized because it stains dentin a dark gray.

Non-Eugenol sealers do not contain Eugenol and consist of a wide variety of chemicals (Chlorapercha, a combination of chloroform and gutta percha).

Endomethasone – a pink antiseptic powder is mixed with eugenol. It contains: Zinc oxide, Bismuth subnitrate, Dexamethasone, Hydrocortisone acetate; Thymol iodide, Paraformaldehyde and as liquid – Eugenol.

Iodoform paste is absorbed by the body and any seal achieved at the time of root filling is short lived. The paste is often used without a metal or gutta percha point. The paste is introduced with spiral root canal filler. Constituents: Powder –Iodogorm and Liquid (Parachlorphenol, Camphor, and menthol).

The main advantage with the available root filling materials both metal and gutta percha is they require a sealer.

Spreaders, pluggers and heat carriers are used for condensation of gutta percha into the root canal.

Knowledge level control:

1.What is root filling?
2.What are the demands for root filling materials?
3.Answer the classification of root fillings?
4.Name the indications for application the different groups of filling materials for root canals, their features.

Tests:

1. What material is not used for the filling of the root canals of the temporary teeth?
A. Iodent
B. Apexdent
C. AH 26
D. Iodent

2. Specify possible reason of root canal refilling:
A. Wrong choice of filling material
B. Wrong determine of the working length
C. Wrong choice of filling technique
D .Wrong choice of the instrument for obturation

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Practical Lesson № 15

Differentiated credit

The semester differential credit is a form of final control, which consists in assessing the student's acquisition of educational material from the discipline on the basis of current control and completed individual test tasks at the last lesson.

During the semester differentiated credit students are given a test control work in the form of 80 test tasks from various sections of propaedeutics of Pediatric TherapeuticDentistry. Each correct answer is estimated at 1 point. The minimum number of points that the student can score for passing the differentiated test must be 50 points