

THE MINISTRY OF HEALTH OF UKRAINE  
THE HIGHER STATE EDUCATIONAL INSTITUTION OF UKRAINE  
"UKRAINIAN MEDICAL STOMATOLOGICAL ACADEMY"

Approved at the meeting of orthodontics  
« \_\_\_\_ » \_\_\_\_\_ 20 \_\_\_\_ y.  
protocol № \_\_\_\_ by \_\_\_\_\_  
Head of department \_\_\_\_\_ L.V. Smaglyuk

**METHODICAL RECOMMENDATION**  
**for independent work of students during the preparation**  
**to practical lessons and on the lessons**

Academic discipline	Orthodontics
Module № 3	
The theme of the lesson № 2	Clinical and biological substantiation of children's dentures. Types of prosthetics in children with malocclusion 2nd class by Angle. Constructions of dentures in children for restoration of anatomical form of teeth. Replacement by fixed dentures.
Course	V
Faculty	Preparation of foreign students

Poltava 2017

**1. The relevance of the topic.** Pediatric prosthetics is part of routine oral cavity sanitation in children since early extraction of temporary teeth violates the integrity of dental arches. This leads to impairment of the masticatory function, development of dento-gnathic deformities, and also diseases of the digestive organs. Defects of the teeth crowns and dental arches occupy a special place among dental diseases. This is connected with the characteristics of the children's organism which is actively developing. Unfortunately many professional dentists underrate the role of temporary teeth.

**2. Specific objectives:**

To know the causes that contributes to the development of the separate teeth and dental arches defects.

To know the features of the separate teeth and dental arches defects.

To know the algorithm for examining patients with the separate teeth and dental arches defects.

To know the classification of dental arches defects.

To be able to diagnose different clinical forms of the separate teeth and dental arches defects.

**3. Basic knowledge's, abilities, skills necessary for studying the topic (interdisciplinary integration)**

Name of previous disciplines	Skills
1. Anatomy	to determine the deviation of the teeth hard tissues structure
2. Propaedeutics of orthopedic somatology	to know the classification and features of dentures for separate teeth and dental arches defects reconstruction.
3. Orthodontics	to know classification of malocclusion by Angle

**4. Tasks for independent work during preparation to the lesson and on the lesson**

4.1. A list of the main terms, parameters, characteristics that need to learn by the student during the preparation to the lesson:

Terms	Definition
1. Crown	Orthopedic appliance, microprosthetics, covering the crown part of the tooth or a separate part of the surface. Used to repair teeth defects that are not subject to less invasive treatments to change shape, position (rotation, dystopia), and color of teeth.
2. Inlays	Prostheses, which restore the anatomical shape of the tooth, filling the defect in its crown. The inlays are referred to as microprostheses and used to

	restore the shape and function of the crown part of the tooth, disrupted as a result of carious and non-carious lesions of the hard tissues of the teeth. Inlays are also used for locking fixation and as a support for fixed and removable dentures and splicing structures.
3. Pin crown-inlay	Is a permanent prosthesis that completely replaces the crown of the tooth and is strengthened in the root canal with a pin. This type of prosthesis is used for subtotal or complete destruction of the natural crown of the tooth, as an independent prosthesis, as well as for fixing non-removable prostheses, for example, bridges.
4. Bridge-liked denture	Type of denture for replacement of dentition defect.

#### 4.2. Theoretical questions to the lesson:

1. Name classifications of dental crown defects in children.
2. What is the “total defect” of a tooth?
3. Name indications for making crowns.
4. What denture constructions replace tooth crown defects?
5. What classifications concern tooth crown defects?
6. Enumerate the main indications for application of standard metallic crowns.
7. Enumerate the main indications for application of celluloid caps during temporary teeth restoration.
8. What instruments are used to adjust standard crowns on temporary teeth?
9. Individual metallic crowns. Their advantages and stages of making.
10. Name the stages of making thin-walled individual crowns.
11. Alloys of what metals are used to make metallic crowns?
12. How can one make celluloid caps for temporary teeth restoration?
13. Name the classifications used in inlay production.
14. Enumerate indications for making inlays.
15. Substantiate advantages of inlays over fillings.
16. Enumerate indications for making Ilyina-Markosian’s pin crowns.
17. Into what groups are inlays classified?
18. What materials are needed to make inlays?
19. Enumerate general indications and contraindications for making pin crowns.
20. Enumerate indications for making Richmond’s pin crown.
21. Name the advantages of Katz’ pin crown.
22. Describe Akhmedov’s pin crown.
23. Into what groups does S.I. Tril subdivide all dentures depending on their functionality?
24. Who was the first to offer prophylactic supporting appliances-dentures?
25. What does E.M. Gofung offer in case of early extraction of a temporary molar?

26. Name the components of K.N. Shamsiyev's fixed prophylactic device.
27. What are the common and different features of K.N. Shamsiyev's and S.I. Tril's extensible dental bridge constructions?
28. When are whole cast dental bridges without abutment teeth preparation indicated according to S.I. Tril?

4.3. Practical works (task) which are executed at the lesson:

Identification of risk factors for development of separate teeth and dental arches defects.

Definition of risk groups for development of separate teeth and dental arches defects.

Collect anamnesis of the disease of an orthopedic patient with defects in hard tissues of the tooth crown and dental arches defects.

Describe and classify possible deviations from the norm in the dento-alveolar system with defects in the hard tissues of the tooth crown and dental arches defects.

Correctly put the corresponding previous diagnosis for defects in hard tissues of the tooth crown and dental arches defects.

### **The content of the topic:**

#### **TEETH DEFECTS DIAGNOSTICS**

To diagnose defects of the dental crowns different classifications have been offered (Black, M.B. Bushan), which are mostly used in preventive dentistry. Y.V. Milikevych recommended defining the index of destruction of the occlusal surface of the tooth in the period of permanent occlusion. V.S. Kurylenko developed a classification which is closer to the prosthetics of dental defects in children, but it does not include the degree of tooth roots formation or resorption in children. Clinical trials have shown that dental crown defects of different etiology in children are already found at early stages of dento-gnathic apparatus formation, i.e. still in the period of temporary occlusion, therefore they require urgent orthopedic treatment. When one chooses denture construction to restore a defect of the crown of a temporary (milk) tooth, one should find not only its cause but also the degree of destruction, the state of the root system (i.e. the degree of root formation or resorption), and also the ability of the tooth to withstand a functional load, i.e. one should conduct thorough differential diagnostics to make a final diagnosis. Such an approach is important in the diagnostic process in the period of both temporary and permanent occlusion, and especially in the period of transitional dentition, when temporary and permanent teeth with different conditions of the root system are found in the dental arch simultaneously. V.P. Vozniuk offered a classification of dental crown defects in children on the basis of epidemiological research and clinical observations.

It takes into consideration the following diagnostic criteria:

first of all temporary (I) or permanent (II) teeth are determined;

then condition of the pulp: teeth with the vital pulp (1) or devitalized pulp (2);

condition of the roots: without root resorption (A), with root resorption (B) – by 1/3 (a), by 2/3 (b), by 3/3 (c); with a formed root (C), with an unformed root (D): by 1/3

(a), by 2/3 (b). According to topography and localization (III): on the upper jaw (IIIA), on the lower jaw (IIIB), lateral teeth (1), frontal teeth (2). In its turn, one classifies the localization of the defect on the lateral teeth (1) on the masticatory surface (a), approximal surface (b), masticatory approximal surface (c), atypical location (d), total defect (e); defects on the frontal teeth: cutting edge (a), approximal surface (b), cutting approximal surface (c), atypical location (d), total defect (e). According to etiology (IV): caries (a), trauma (b), anomaly of the structure of the hard tooth tissues (c), anomaly of the form (d), if the tooth is worn down (e).

#### DENTAL ARCH DEFECTS DIAGNOSTICS

Early loss of temporary and permanent teeth in children conditions considerable changes in the masticatory apparatus consisting in the violation of the anatomical and functional unity of dental arches, correlation of teeth and dental arches, masticatory apparatus and elements of the temporomandibular joints.

Many specialists have been studying the influence of early extraction of temporary and permanent teeth on the growth of jaw bones, and also on the formation of dental and alveolar arches. For this purpose they conducted anthropometric measurements of the diagnostic models, X-ray examination, experimental investigations on animals; used functional methods of masticatory apparatus diagnostics.

Clinical experimental morphological research allowed establishing that dental arch defects (DADs) cause changes of the functional load of teeth, which in its turn leads to the development of dento-gnathic pathologies. The type of clinical presentation of DADs depends on the causes of teeth loss, type of occlusion, age of the patient, on the type of teeth limiting the defect, on the number of teeth, defect prescription, which complicates DADs diagnostics.

#### DENTAL ARCH DEFECTS CLASSIFICATION

A number of classifications have been offered to conduct differential diagnostics of DADs. Thus, Y.N. Aleksandrova (1960) classifies all dental arch defects into minor, moderate and major.

V.P. Lepekhina (1974) singles out three groups of DADs taking into account the topography of the defect, its extent and functional disorders: 1st group — uni- or bilateral DADs, which developed as a result of extraction of all temporary molars;

2nd group — bilateral DADs, which developed after extraction of three or more temporary teeth;

3rd group — unilateral DADs, which developed after extraction of two—three teeth.

Q. Bier-Katz (1982) developed a classification of dental defects both for temporary and transitional dentitions, and also for each jaw separately. The author singles out three classes and three subclasses in each class, which allows taking into account the missing teeth on each jaw.

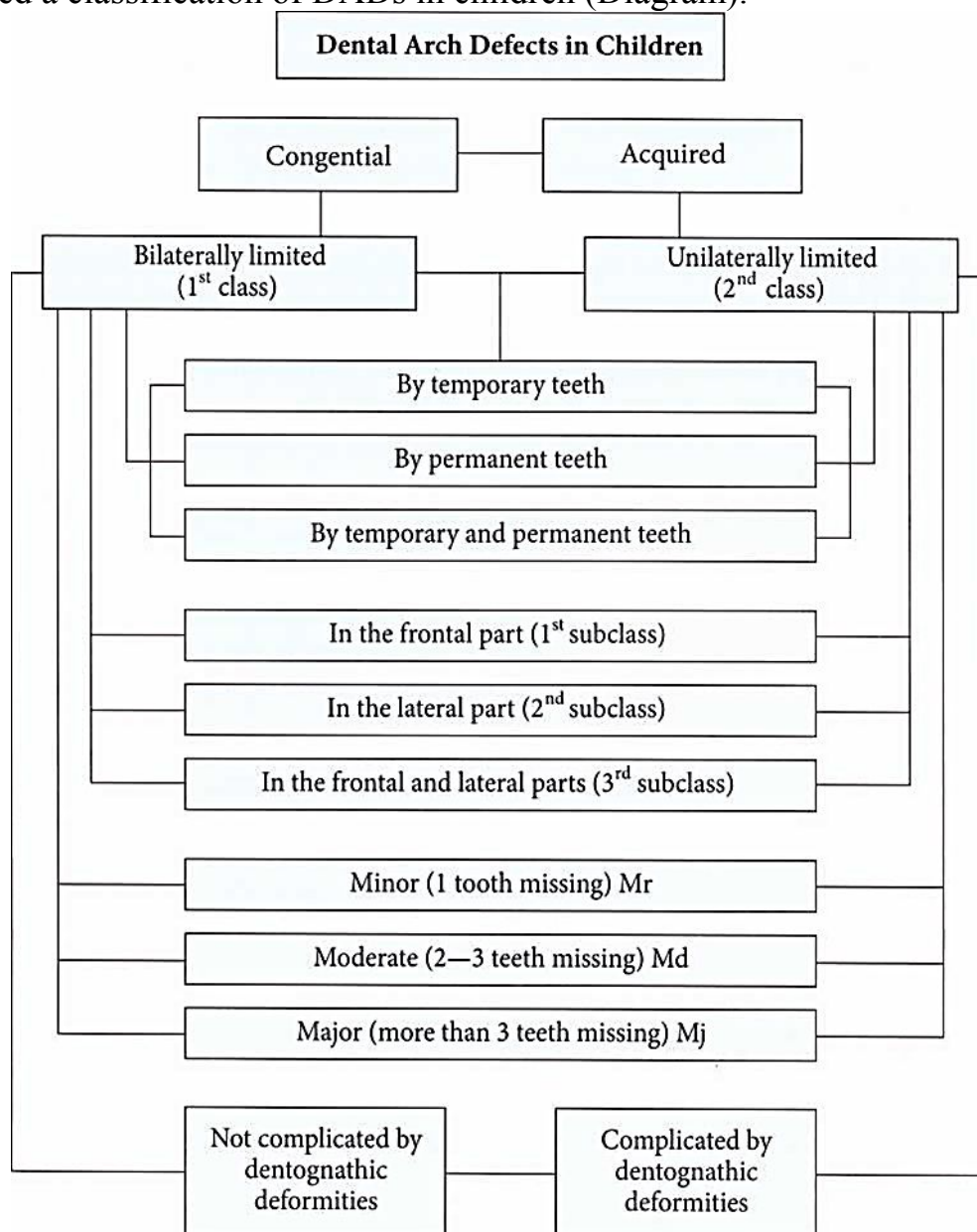
K.N. Shamsiyev (1985) divides all DADs into: complete and partial, congenital and acquired. The author classifies partial DADs according to localization into frontal, lateral and associated. Defects in the lateral part of the jaw are subdivided into unilateral, limited by teeth on one side, or associated — on both sides.

L.D. Chuchmay (1967) notes that together with determination of the DAD class one should pay attention to the form of the alveolar process in the region of the defect.

The author singles out three clinical forms of a toothless alveolar process depending on the location of teeth relative to its apex: sharp, medium round, round.

Still, none of these classifications fully covers the types of DADs, what teeth limit the defect (temporary, temporary and permanent, only permanent), none of them substantiates the classification of defects into minor, moderate and major, they give no information concerning possible dento-gnathic deformities developing in children as a result of early teeth extraction.

Having analyzed the clinical presentation of DADs, Z.S. Vasylenko and S.I. Tril developed a classification of DADs in children (Diagram).



The classification is essentially anatomical-functional-etiological. It is based on

etiological, anatomical and functional signs.

According to etiology DADs in children are divided into two groups: congenital and acquired.

Congenital DADs include defects arising as a result of violated development of ecto- and mesodermal fetal leaves, pathology of the the mother's endocrine glands (Z.S. Vasylenko and S.I. Tril's classification of dental arch defects in children (thyroid, parathyroid), severe infectious diseases of the mother (adentia, Papillon-Lefevre syndrome, syphilis, tuberculosis); acquired DADs include defects caused by complicated caries, which cannot be treated conservatively, trauma, retention, osteomyelitis, tumor-like masses, periodontitis, eosinophilic granuloma.

According to DADs limitations two classes are singled out:

1st class – bilaterally limited DADS.

2nd class – unilaterally limited DADS.

Taking into account the functional state of the children's dento-gnathic apparatus such defects have been singled out: limited by temporary, permanent, temporary and permanent teeth.

Depending on defect localization there are differentiated three subclasses: the 1<sup>st</sup> includes DADs in the frontal part, the 2nd – DADs in the lateral part on one or both sides of the dental arch, the 3rd – associated defects located in the lateral and frontal parts of the dental arch.

Depending on the number of missing teeth and the extent of defects there are singled out three groups of DADs designated in the following way:

- minor (Mr) – one tooth is missing;
- moderate (Md) – two-three teeth are missing;
- major (Mj) – more than three teeth are missing.

There are also differentiated DADs complicated by dento-gnathic deformities and uncomplicated DADs.

Such classification covers the whole range of DADs developing in children, thereby making diagnostics easier, and, correspondingly, allows predicting further orthopedic treatment, substantiates the choice of efficient denture construction.

Examination of children with DADs (algorithm):

Condition of the oral mucosa: normal; pathologically altered: alteration; focal inflammation; exudation; excoriation; erosion; ulcer; proliferation; tubercle; nodule; scar.

Lip frenula attachment: near the base of the alveolar process, in the middle, on the apex.

Zones of movable mucosa:

- neutral zone (width – 1-2 mm, 3-6 mm, 6-8 mm);
- mucogingival fold (normal, deformed).

Tongue frenulum attachment: normal; shortened frenulum.

Mucosa elasticity: moderately elastic (0.6-4 mm); loose (2-6 mm); unevenly elastic; atrophic (0.5-1).

The form of the alveolar process in the region of DADs: sharp; rounded; round.

The form of the palate: dome-shaped; gothic; flat.

Torus: elongated; semicircular; pear-shaped.

Condition of teeth: healthy; carious; non-carious lesions; complicated caries; trauma; anomalies of location; anomalies of form; anomalies of size.

Condition of dental arches: within norm; narrowed (uni-, bilateral); Y-shaped; saddle-shaped; trapeziform.

Condition of occlusion:

1. Physiological occlusions:

- orthognathic;
- direct;
- physiological biprognathic;
- opisthognathism.

2. Pathological occlusions:

- distal (I, II, III, IV forms)
- mesial (I, II, III forms)
- open (I, II, III forms)
- deep (I, II forms)
- cross (uni-, bilateral).

Characteristics of dental arch defects:

Topography and localization of defects:

1. Upper jaw.

2. Lower jaw:

- frontal part;
- lateral part;
- frontal and lateral parts.

Type of defect limitation:

1. Limited by teeth on one side.

2. Limited on both sides by:

- temporary teeth;
- temporary and permanent teeth;
- permanent teeth.

Size of the defect:

- minor (one tooth missing);
- moderate (two—three teeth missing);
- major (more than three teeth missing).

Number of defects (1, 2, 3 and more).

Change in defect size: absent; shortening; elongation.

Complicated by deformations: horizontally; vertically; transversally; without occlusion height decrease; with occlusion height decrease.

Causes of dental arch defects: complicated caries; trauma; retention; adentia; early extraction; osteomyelitis; eosinophilic granuloma, etc.

Duration of the period of teeth absence.

## PROSTHETICS OF TEETH DEFECTS IN TEMPORARY OCCLUSION



Dental crown defects of different etiology are the earliest and most widespread form of dento-gnathic apparatus disorders. The main technique of their elimination is filling. Nevertheless, according to domestic and foreign literature, it cannot qualitatively and permanently solve the problem of restoring the form and function of teeth, especially in case of considerable destruction of teeth crowns. Overwhelming majority of clinicians prefer inlays in these cases. Nevertheless, opinions vary on their efficiency, indications and contraindications for their application. Any filling or inlay should restore esthetic norms, strengthen the residual structure of the tooth, resist destructive load. Compliance with these requirements is possible in case of correct modelling of the occlusal surface of inlays. To analyze the type of occlusal surfaces and direction of the action of masticatory load one uses mechanical models of the systems “antagonist-masticating pressure-occlusal plane-cement-tooth structure”. Inlays for replacement of teeth crown defects are made of different materials: metal alloys, porcelain, plastic. Vast majority of scientific investigations are dedicated to the development and improvement of inlays in adults. In pediatric practice inlays are used less frequently to replace teeth crown defects. In children preparation of a dental cavity for an inlay is to be carried out carefully trying to preserve as much hard tissue as possible. The most acceptable classification of cavities for inlays in pediatric practice was developed by D.N. Tsytrin.

The upper frontal teeth and first molars are more frequently destroyed in children than in adults. Inlays are indicated to replace these defects. Not infrequently traumas cause breaking off of the cutting edge or an angle of the frontal teeth. It is difficult to restore the form of a tooth angle with filling material; the filling is unstable in this case. Inlays are more appropriate, nevertheless, their stability should also be provided, because during biting of food the frontal teeth are exposed to increased lateral load. One should deliberately choose inlay construction and prepare the dental cavity. Inlays are the most perfect method of treating destroyed teeth because they allow restoring the anatomical form and function of teeth not injuring the adjacent tissues. To determine tooth crown defect in children one is recommended to use the simplest and most comfortable classification offered by V.S. Kurylenko.

In temporary teeth specialists recommend to eliminate only the defects, which developed in median caries. Nevertheless, they can be rather successfully replaced with a filling of high quality with the least psychological impact on the child and considerable saving of working time of the dentist and dental technician.

Teeth with partial defects of temporary teeth crowns of a rather considerable area, which are observed in circular caries, systemic hypoplasia or enamel aplasia, in the presence of a couple of carious cavities in one crown, pathological wearing off of temporary teeth are to be covered with thin-walled metallic crowns.

Thin-walled metallic crowns are made without temporary teeth preparation, therefore the relief of their masticatory surface does not change, as a result the fissure-tubercle contact with the opposing teeth is preserved. This provides adequate distribution and transfer of masticating pressure, children quickly get used to the artificial crown, there are no changes in the periodontium; in such a case germs of permanent teeth develop normally and the process of temporary teeth roots resorption

is not violated. Such crowns allow preserving the functional value of temporary teeth until second dentition, which will positively influence the growth of the jaw bones, development and timely eruption of permanent teeth and their correct articulation correlation.

The approach of orthopedic treatment of temporary teeth in case of considerable or complete destruction of their crown part depends on the condition of crowns and terms of second dentition. If the root system is stable (incomplete root formation, complete root formation, inconsiderable resorption of the apical part of the root by  $\frac{1}{3}$  of its length) and the terms of second dentition are remote (from 1.5 to 4 years), one for use thin-walled metallic crowns to replace partial defects of the crowns of teeth with removed pulp, but after therapeutic treatment.

To replace major temporary teeth crowns defects of carious origin there have been offered standard metallic crowns made of nickel-chrome alloy. Such crowns can provide protection against further destruction of thin and brittle dental tissues preserved after treatment of complicated caries until they are replaced by permanent teeth. The technique of crowning a tooth with a standard metallic crown is simple and requires much less time than restoration. Standard metallic crowns do not influence the physiological replacement of temporary molars: the teeth fall out together with the crowns. Industrially produced metallic crowns are well-known in Great Britain and European countries (3M Dental, Loughborough, UK). Clinical trials proved the effectiveness and expedience of their application. A crown made of nickel-chrome alloy, i.e. a standard metallic crown, is an optimal method of restoring considerable carious impairment of temporary teeth. Restoration should meet certain requirements. Ideally, it should have a service life period corresponding to the terms of second dentition and provide protection of hard tooth tissues. Investigation of the service life of amalgam fillings in temporary teeth showed that many of them require replacement before second dentition. Metallic crowns rarely require replacement unlike fillings made of amalgam, composite materials, glass ionomer cements. Standard metallic crowns not only completely cover teeth crowns weakened by extensive odontic preparation, but also provide protection from possible recurrence of the disease of such teeth, especially in children running a high risk of caries.

The technique of crowning teeth with standard metallic crowns is simple and requires less time than teeth restoration. Contemporary standard crowns are so well constructed that do not require substantial undercutting and fitting before crowning, and tooth preparation is minimal and quick. Special literature provides no information on the use of post constructions in case of complete destruction of temporary teeth crowns. Only L.V. Ilyina-Markosian offers to use a pulp cavity to fix inlays in teeth with removed pulp and make the dental cavity of squared shape proceeding in the form of a short canal in the root orifice.

Temporary occlusion is an important period of dento-gnathic apparatus development, which consists of three main stages: formation, stabilization and “wearing-out”, or “aging”, i.e. preparation for permanent teeth eruption. Each of these stages has its morphological and functional peculiarities, which should be considered in the course of orthopedic treatment. In the period of temporary

occlusion there takes place the first stage of occlusion height establishment, which finishes with eruption of the last molars, therefore only preservation of all temporary teeth allows keeping occlusion height at the appropriate level. The root system of teeth at the stage of temporary occlusion formation also undergoes a number of changes: from formation to resorption of roots, which should be taken into account when one chooses denture construction, because in each particular case the force of pain induction (VPD) in the tooth, i.e. its ability to endure maximum load, will be different. The period of temporary occlusion is characterized by certain occlusal correlation of the dental arches – in one horizontal plane. Nevertheless, interocclusal contacts also undergo certain changes. There develop tremas and diastemas between teeth as a sign of more active growth of jaws, which leads to alteration of occlusal contacts and physiological wearing out of teeth. The latter promotes medial displacement of the lower jaw, in consequence of what occlusion changes from orthognathic to straight. In this period rearrangement of the temporomandibular joints is more active, myodynamic balance of the masticatory muscles improves, sound articulation, i.e. speech function, is actively formed. Only under the condition of temporary teeth integrity the above mentioned processes take a physiological course. In this regard preservation of temporary teeth, even decayed ones, is very important for further formation of the dento-gnathic apparatus.

If a tooth crown is completely destroyed, which is observed even in 2-year-old children, V.P. Vozniuk offered a denture construction in the form of a pin crown-inlay. A pin crown-inlay contains an artificial crown, a pin and a semiring on the lingual and vestibular sides, the edges of the semirings repeat the form of the gums, and the length of the pin makes 2-4 mm. This allows increasing the area of the contact of the pin construction with the temporary tooth root and respectively the strength of its attachment to the root.

**Temporary pin crown-inlay.** After endodontic treatment one makes a pin hole 2–4 mm deep in the tooth root with a direct diamond dental drill, obtains an impression of the stump with a hole and sends it to the dental laboratory to make a whole cast construction of the pin crown-inlay. Modeling of the crown-inlay frame and casting are carried out according to a generally accepted technique. Retention balls (pearls) and a composite covering material are used to make a crown. The stump tightly covers the root surface because the surface of material contact corresponds to the form of the surface of the boundary part of the gums, and the form of the pin – to the form of the hole in the root. Edges of the stump, which border upon the gum, form two semirings on the lingual and vestibular sides enveloping the surface of the root. The whole cast pin crown-inlay is fixed on the root with the help of glass ionomer cement. A pin crown-inlay allows restoring the form of the tooth crown in case of its complete destruction, providing its solid fixation on the tooth, achieving the highest cosmetic and functional effect.

Indications for application of standard metallic crowns:

- restoration of temporary molars under the condition that some surfaces are substantially restored;
- restoration of teeth in children with a high activity of the carious

process;

- restoration of teeth after treatment for pulpitis, which usually makes temporary molars brittle and predisposed to fractures;
- restoration of teeth with development defects;
- restoration of broken temporary molars;
- preservation of an interdental space;
- in bruxism;
- restoration of permanent erupted molars with hypoplasia.

#### FITTING OF STANDARD METALLIC CROWNS

A set of standard metallic crowns, available in Great Britain and European countries, is supplied by 3M Dental. Crowns are available in many sizes: from 2 to 7.

#### **Preparation of a tooth consists of a couple of stages.**

**Stage 1.** Local anesthesia and rubber dam. One should conduct local anesthesia, though it is not always necessary in the course of tooth restoration after pulpitis treatment. However even in such a case one should prepare teeth, the free gingiva in particular, which may condition certain discomfort. One should also use a rubber dam. Since one usually prepares for tooth crowning during the same visit when pulpitis is treated, local anesthesia and a rubber dam are already applied. The rubber dam is needed if a metallic crown is adjusted to restore a tooth with substantial caries etc. Where possible the clamp for rubber dam fixation should be mounted on the tooth located distally relative to the tooth subject to restoration. Nevertheless, if a clamp is applied on the tooth, which should be prepared for crowning, there develop complications: preparation of approximal surfaces is complicated because the rubber dam will twist around the drill. In this case the doctor is recommended to carry out all the necessary odontic preparation, except for the distal approximal surface, with a rubberdam. Afterwards it should be removed, the doctor is to finish preparation of the distal approximal surface and crown the tooth without the rubber dam. Alternatively the rubber dam may be drawn aside and fixed in this position from them side of the approximal tooth surface by the dentist's assistant with the help of a flat instrument, e.g. a smoother, when this surface is being prepared.

#### **Stage 2.** Occlusion height decrease.

In order to avoid occlusion height increase after treatment the crown is prepared until the tooth completely gets out of occlusion and there forms space for the crown. If a rubber dam is used, it is difficult to control occlusion. In such cases comparison with the height of adjacent teeth might be helpful, which has been exemplified by completed preparation of the masticatory surface of the left second lower temporary molar.

#### **Stage 3.** Preparation of the medial and distal approximal surfaces.

When one performs the third stage, he should be especially careful to avoid accidental removal of the enamel of the adjacent tooth. The adjacent tooth is secured best by placing a wooden wedge between the teeth before preparing the approximal surface or preparing with a reserve of dental tissues more proximally than the drill during movement in the buccolingual direction. It is marked on the diagram of approximal surface preparation. Preparation of the approximal surfaces is the most

important part of tooth preparation, and one should be particularly attentive for a butt joint or a prominent edge not to form: this would hamper crown adjustment. Interdental papilla bleeding is inevitable. When preparation of the approximal surfaces is finished, one performs verification inspection of preparation quality with the help of a probe to receive evidence that there is no prominent edge and there is enough space for a crown.

**Stage 4.** Smoothing of sharp edges and final inspection of the quality of tooth preparation.

Sharp edges are smoothed and the doctor performs final inspection of the quality of preparation; a gap should be formed from the side of the masticatory and approximal surfaces without any edges protruding onto the approximal surfaces.

**Stage 5.** Choosing a crown for trial adjustment.

For the first time one is recommended to measure the tooth width in the mesiodistal direction with the help of a sliding caliper and choose a crown according to the obtained results. Crown dimensions vary from 2 to 7. They can be tried on until one of them fits. Usually it is better to begin crowning a tooth from the lingual surface, and then move in the buccal direction.

When a crown covers a tooth, it should click under slight pressure. If there is no clicking, it means that the crown is too big and the doctor should select a smaller crown.

**Stage 6.** Crown adjustment.

Contemporary crowns are well constructed and usually require no adjustment, still, in some cases, if the gums turn pale after complete crowning, crown edges are to be cut off. Insignificant paleness is always noted, it is permissible. If there develops evident paleness, crown edges may be cut off with the help of sharp metal crown scissors. After this one should smooth sharp crown edges with an abrasive stone.

**Stage 7.** Bending crown edges.

Crown edges are bent with the help of either crampon pliers, or Adams pliers. This stage aims to provide firm adherence of crown edges to the tooth cervix and prevent plaque formation on the crown.

**Stage 8.** Crown cementation.

At this stage it is important for cement to be mixed correctly and fill the crown completely. At first the crown is put on the tooth from the lingual side, and then from upwards onto the buccal side. If it fits correctly and tightly and is bent, resistance is felt during fitting, and after the crown settles on the tooth completely, clicking is heard. If a rubber dam is used, the dentist pushes on the crown until cement hardens. If a rubber dam is not used or was removed before cementation, the child may be asked to clench his teeth tightly. If the dentist is to crown two adjacent teeth during one visit, both crowns are mounted on the cement simultaneously.

**Stage 9.** Removal of cement excess.

Cement should harden to such an extent that any excess can be easily removed with the help of a suitable instrument. All excess cement must be removed from the approximal surfaces by the gingival margin. A floss with a single knot fits the best

for this purpose. It is pulled back and forth in the interdental space by the cervices removing cement excesses. It is advisable to polish crowns with a rubber head and grind them with pumice.

**Stage 10.** Final inspection of crown quality.

At the final stage the crown is to be checked in occlusion and slightly polished with special paste. One should not pay attention to slight disturbances of occlusion because after crowning temporary molars can adapt independently in a short space of time.

**Stage 11.** Case monitoring.

During every scheduled visit the dentist is to check the crowns in occlusion, their abutment to the tooth cervix, adjustment and fit. Special attention is to be paid to the condition of the gingival margin around the crown. If the crown edges are qualitatively bent and fit nicely, dental deposit is easily removed by means of daily oral hygiene.

### PROSTHETICS PROBLEMS AND THEIR SOLUTION

1. The crown does not fit from the side of the approximal surface. As a rule, this means that there is a prominent edge. It is removed with the help of a cone-shaped fissure drill.
2. Defective fitting of the crown to the tooth. Sometimes such a defect is caused by caries on the approximal surface of the restored tooth and displacement of the tooth located more distally in the dental arch. In this situation a standard metallic crown, which fits a tooth tightly in the anteroposterior direction, will appear too large in the mesiodistal direction. In order to eliminate the indicated defect the crown is slightly turned in the anteromedial direction in such a way that it somewhat protrudes from the dental arch. If a crown fits too tightly, it can be squeezed in the mesiodistal direction being fixed in the beaks of Adams pliers to reduce its size. This is an effective method of correcting a mismatch between the form of a metallic crown and the tooth crown by reducing the size of the metallic crown in the mesiodistal direction. After the crown form is corrected, one should carefully bend its edges because they deform as a result of squeezing.
3. Requirements of parents concerning the esthetic appearance of the child's oral cavity after prosthetics. Parents rarely object to crowning teeth with metallic crowns, still, if they are worried about the esthetic aspect, crowns may be faced with a composite material applied onto previously cut opening on their anterior surface.
4. Physiological falling of a tooth covered with a metallic crown. Standard metallic crowns do not influence.

### REMOVABLE CELLULOID CAPS FOR RESTORATION OF TEMPORARY INCISORS

Unattractive appearance or discoloration of temporary incisors in children is one of the reasons why parents appeal to a pedodontist for the first time. These teeth may be carious, discolored due to a congenital defect or a trauma or some malformation.

Caries of the upper frontal incisors is a persistent sign of nursing caries syndrome, also known as bottle caries or nursing bottle caries of the oral cavity. Such

teeth must be restored. Nursing-induced caries is observed in preschool children and is caused by frequent and prolonged consumption from a bottle of drinks containing fermentative carbohydrates. This first of all concerns children's fruit drinks. However, such types of caries may also develop when a child consumes milk-based drinks and even during breast feeding. Such children are often allowed to suck from a bottle at night. During sleep salivation slows down considerably, thus, the buffer action of the saliva and mechanical cleaning are reduced to minimum. This leads to quick demineralization of the enamel and aggressive clinical course of caries. As a rule, the upper incisors and lower first temporary molars are affected the most. The lower incisors are rarely affected because during sucking they are protected by the tongue and are directly washed by the saliva produced by the submandibular and sublingual salivary glands.

Treatment of decayed temporary incisors depends on the stage of destruction, children's age and the possibility of establishing contact with them. The dentist can choose a preventive program including pieces of advice concerning feeding organization, oral hygiene methods. In order to stop the carious process and prevent its complications one should use fluorine preparations of local and systemic action.

For esthetic restoration of temporary incisors one may resort to standard celluloid caps in the form of teeth crowns for restoration with composite materials. This technology is known as the technique of restoration with the help of removable celluloid caps.

Indications for teeth restoration with removable celluloid caps:

- deep caries of one or some surfaces of temporary incisors;
- congenital malformation of temporary incisors;
- discoloration of temporary incisors after a trauma;
- traumatic fractures of temporary incisors;
- temporary incisors with congenital discoloration (e.g. as a result of congenital erythropoietic porphyria);
- amelogenesis impairment.

Materials used for teeth restoration with celluloid caps. Most materials required for this technique can be afforded by any dental clinic. We mean standard sets of dental instruments used for teeth filling, handpieces, a cone-shaped drill for handpieces, a small ball-shaped drill for carious tissue removal, calcium hydroxide or glass ionomer cement for liners, simple composite material with appropriate etching and connecting materials, a light curing lamp and thin curved scissors. Celluloid caps in the form of crowns are available as the set 3M Strip Crown Kit (3M Dental, Loughborough, UK and of other firms). It is supplied with caps of different sizes specially made in the form of upper temporary incisors.

To restore with the help of caps one can use most contemporary filling materials on the basis of hybrid or microfilled composite resins. However, to achieve the best results one should take into account some factors before choosing a material. Some contemporary composite materials have colors of dentin — darker than the standard frontal teeth composite. These materials fit the best because they can effectively mask any change in the color of the dentin or whiteness of liner materials.

It should also be noted that one should prefer material packaged in capsules, because they allow to easily fill caps for restoration.

If there remains little enamel after carious tissue removal, the strength of composite material fixation to both dentin and enamel is of high importance. At present there exist two bonding systems conditioning micromechanical connection with the dentin. They contain a resin (such as Glums 2000) and a solvent (such as ABC). Any of them fits the technique of restoring teeth with the help of caps. If a doctor is supposed to restore all the four upper incisors, it would better be done during one visit. But, if one plans to restore the teeth during two visits, it is recommended to restore two central incisors during the first visit, and two lateral – during the second visit. This will provide correspondence of the color and form between the left and right teeth. Restoration with the help of removable celluloid caps is a quick, simple and effective technique of restoring temporary incisors. Most children are satisfied with their improved appearance and we hope that this will heighten their (and their parents') interest in the good condition of their teeth.

#### CLINICAL-LABORATORY STAGES OF MAKING THIN-WALLED METALLIC CROWNS

Thin-walled metallic crowns have many advantages. When one applies them, there is no need to mechanically process the hard dental tissues, therefore the protecting coat of the tooth – enamel – is not affected. Consequently, this causes no painful sensations and the child feels no fear of manipulations which is very important in pediatric practice.

Owing to elastic properties of steel and presence of gingival enamel elevation on the temporary teeth a thin-walled crown is 8–10 times denser than an ordinary one, it envelops the tooth cervix preventing its decementation and development of cervical caries. As a result, after chemical and mechanical processing the thickness of a thin-walled crown reduces to 110–120 mcm; if it is used, occlusion height increases inconsiderably and restores in a short time due to plastic rearrangement of the periodontium of the crowned tooth and the teeth opposing it, therefore its crown tightly fits the tooth cervix and ends at the level of the gingival margin excluding the development of inflammatory processes in the gum.

Thin-walled metallic crowns are made without teeth preparation, therefore the relief of their masticatory surface does not change, consequently the fissure-tubercle contact with the opposing teeth is preserved, which provides adequate redistribution and transfer of masticatory pressure, the child quickly gets accustomed to the artificial crown, there are no changes in the periodontium. Besides, permanent teeth germs develop normally and the process of temporary teeth roots resorption is not violated.

Clinical stages:

1. Impression tray selection.
2. Taking an impression.
3. Crown adjustment.
4. Crown cementation.

Laboratory stages:



1. Making plaster models.
2. Plastering in the occluder.
3. Wax modeling.
4. Stamping a metallic crown according to the standard method.
5. Chemical treatment and polishing of the crown.

If thin-walled metallic crowns are fixed on unprepared teeth, 50 % children have an insignificant increase of occlusion height, which normalizes in 1–2 days as a result of plastic rearrangement of the periodontium of abutment teeth; children quickly get accustomed to the crown and usually do not complain.

Thus, with the help of thin-walled metallic crowns one can restore the anatomical form of temporary teeth and preserve their functional value till second dentition, prevent caries recurrence and further decay of temporary teeth and development of dento-gnathic deformities; provide normal course of the first stage of occlusion height establishment, thus creating favorable conditions for the second occlusion height increase, normal growth of the jaw bones, development of permanent teeth follicles, their timely eruption, normalization of the masticatory function and harmonious development of the facial skeleton.

#### CLINICAL-LABORATORY STAGES OF MAKING PIN CROWNS

In order to restore the anatomical form of the crowns of frontal teeth with removed pulp one applies different pin constructions. Certain conditions are required to make efficient pin crowns both in children and adults: the length of not filled part of the root should exceed the length of the restoring crown, the walls of the stump of the crown and root are to be strong and sufficiently thick, the cervical part of the tooth crown should protrude above the level of the gingival margin by 1–2 mm and be located at a sufficient distance from the opposing teeth, there should be no pathological processes in the periapical tissues.

Indications for pin construction application include complete destruction of the tooth crown, poor fixation of large fillings in teeth with removed pulp, and impossibility to restore the anatomical form of the tooth crown with fillings. Absolute contraindications for making pin constructions include temporary teeth and teeth with underdeveloped roots, relative – low location of the tooth crown stump (in the paragingival area) and a pathological process in the periodontium.

Not infrequently during replacement of total defects of frontal teeth crowns orthodontists make all pin crown constructions used in adult patients: an ordinary pin crown, Ilyina-Markosian's pin crown with a cast damping inlay, Katz' pin crown with a semiring, Richmond's pin crown with a complete ring and a facet, Akhmedov's pin crown. Each of these constructions has its advantages and disadvantages.

An ordinary plastic pin crown may be used only for temporary prosthetics, because the crown part of the pin tightly joins the cervical part of the root for a short time. An average period of using such a pin crown makes from 4 to 6–8 months (T.V. Sharova, 1985). It is impossible to make another pin crown for this root because the cervical part of the root is destroyed, located below the level of the gums and filled with the mucous tunic. In such a case the roots are to be extracted, and the dental arch

defect is to be restored with a dental bridge with unilateral sliding support.

Ilyina-Markosian's pin crown is a more expedient construction because it includes a damping inlay, which improves stump hermetization and tooth fixation, especially in case of horizontal loads. However, this construction also does not provide long-term and complete hermiticity between the tooth crown and the root stump. Besides, preparation of a rectangular cavity for a damping inlay reduces root strength, especially in the region of right angles, which may lead to its splitting.

Katz' pin crown includes such elements as a pin, a protective root shield, a semiring (from the lingual or palatine side) and a plastic tooth. The protective root shield and semiring improve hermetization of the tooth crown stump. Still, in this denture construction different parts of the root stump are in different conditions, notably: from the lingual or palatine side the root stump orifices are enveloped with a metallic semiring, while the vestibular and approximal surfaces are free from metallic protection – plastic abuts upon them. Consequently the metal, plastic and dental tissues have different expansion factors, the presence of oral fluid promotes quick cement resorption. Constant action of vertical and horizontal forces during masticatory apparatus functioning quickly violates hermetization between the root stump and the pin crown elements. Afterwards the root stump is gradually damaged on the vestibular side and with time the pin crown falls out.

Richmond's pin crown, used to replace defects of frontal teeth crowns, corresponds to all the requirements of such constructions. Still, to make a high-performance crown of this construction precious metals are needed, which prevents its wide application in everyday practice. Besides, the technique of making such a crown is rather complicated: one is to make a semiring, solder it, make a protective root shield, solder it to the ring and the pin, face the crown with ceramic or plastic materials.

A.A. Akhmedov (1968) offered to use a combined crown with a pin to restore total defects of frontal teeth crowns. This construction is rather stable, simple to make and durable. At the same time, if this crown is used, the tooth stump is unequally protected from different sides: the metallic edge of the crown abuts upon the palatine surface of the root, and the plastic edge – upon the vestibular, cutting edge and approximal sides. Consequently, the construction has the same disadvantages as an ordinary pin crown and Katz' pin crown.

#### PROSTHETICS OF TEETH DEFECTS IN TRANSITIONAL DENTITION

Transitional dentition is the most responsible period of dento-gnathic apparatus formation. This period consists of four stages of occlusion height increase (1st stage takes place in the period of temporary occlusion; 2nd stage – eruption of the first permanent molars and the group of incisors; 3rd stage – eruption of the second molars and the group of premolars with canine teeth; 4th – eruption of the third permanent molars). It should be noted that the 4th stage of occlusion height increase is not always observed as a result of their congenital absence, i.e. adentia. Thus, almost 70 % population of the planet have radiologically verified adentia of one to all four third permanent molars. Therefore one cannot always count on this stage of occlusion height elevation.

Besides, it falls on older age.

In the period of transitional dentition there begins the formation of sagittal and transversal occlusive curves. Their formation may be negatively influenced by both early loss of temporary teeth and their crowns destruction, which leads to medial displacement of teeth and dental arches shortening, and also to dentoalveolar lengthening in the region of extracted opposing teeth. Therefore preservation of temporary teeth and timely prosthetics of teeth and dental arch defects in children allows preventing unfavorable complications from the side of the dento-gnathic apparatus, creating proper conditions for their further formation. This can be realized by means of efficient pediatric denture constructions. Thin-walled metallic stamped crowns are used to cover temporary and permanent first molars. In many children with multiple temporary teeth caries the first permanent molars are also affected by caries already at the stage of their eruption. Such teeth decay quickly not only due to caries but also due to functional overload. Only filling of these teeth is ineffective. Thin-walled crowns are temporary because the molars have not erupted completely. After complete eruption of permanent teeth temporary thin-walled metallic crowns are replaced with permanent denture constructions. Thin-walled metallic crowns are also used in case of traumatic injuries of dental crowns, which are more frequently observed at this age. They are also temporary, made to protect teeth from unfavorable factors and to restore the anatomical form of the tooth, which is especially important during formation of the dental arches and occlusal relations in the period of transitional dentition. Besides, making of thin-walled metallic crowns is less traumatic for children because they do not require teeth preparation; they are easily removed if endodontic treatment is required, they also do not hamper the process of permanent teeth roots formation. Nevertheless, they do not meet esthetic requirements of patients and their parents.

#### CLINICAL-LABORATORY STAGES OF MAKING INLAYS

The choice of microp prosthesis construction, which is meant to restore the anatomical form of teeth, depends on the child's age, condition of the pulp, the degree of root formation, form, localization and dimensions of the dental crown defect, type of occlusion. Most often inlays are preferred because they offer a number of advantages compared to fillings. Inlays allow restoring the anatomical form of the tooth, creating contact points with the adjacent and opposing teeth, prevent the development of dentoalveolar lengthening and horizontal deformities, recover the masticatory function. V.S. Kurylenko based her classification of teeth defects, which are to be replaced with inlays, on the ways of retention point formation. Taking this sign into consideration the scholar divides all defects into defects of teeth with removed pulp and of teeth with living pulp. Defects of teeth with removed pulp comprise the first class, and defects of teeth with living pulp – the second class. The second class, in its turn, is subdivided into four subclasses. The first subclass includes defects of the masticatory teeth, in which cavities are located on one approximal, masticatory-approximal or two approximal surfaces.

The second subclass includes defects of the frontal teeth, in which cavities are located on the approximal surface and there are no cutting angles. The third subclass

includes defects of all groups of teeth, in which cavities are located on any surface except for Class 1 defect according to I./S. Kurylenko. The fourth subclass includes atypical cavities, i.e. cavities and teeth, which cannot be referred to any of the mentioned three subclasses. The doctor records pulp condition, teeth group, and teeth class according to defect localization in the case history, and then proceeds to the next stage – preparation of the cavity. Inlays are made of steel, titanium, different alloys, for instance gold and platinum, silver, palladium, and also plastic, ceramics or combinations of materials (metal–plastic, metal–ceramics, metal–composite). In order to provide reliable fixation of an inlay in the dental cavity there are created additional retention points or metal fitting is introduced. If inlays are used in children, one should provide their proper fixation: isolation of the broad dentinal tubules with the living pulp from the toxic action of the materials used to make inlays, prevention of secondary caries development, exact and tight abutment on the tooth. An inlay is fixed securely due to introduction of a fixture, whose construction depends on defect topography and pulp viability. Inlay fixture is made of steel orthodontic wire, located along the tooth axis and fixed with cement in microtubules prepared in the dentin. If the pulp is living, tubules are made in the dentin parapulpally with a spherical drill. In cutting edge defects tubules must be vertical and parallel to each other, in angle defects one tubule is made vertical and another one –horizontal (at a right angle). Tubule length should not exceed 3–5 mm, it depends completely on defect topography and child's age. In tooth crown defects associated with pulp lesion microprosthesis is made after appropriate therapeutic treatment of the tooth taking into account root formation. If the tooth root is formed completely, after pulp extirpation the canal is filled to the apex leaving the orifice and the middle part of the canal free from cement for introduction of the reinforced part of the inlay. If the root system is not formed, the doctor covers the pulp stump with dental treatment paste, which stimulates biological processes of root apex growth, and the canal orifice is filled with cement, into which the reinforced part of the inlay is introduced.

Because of complete absence of permanent teeth crowns in children in the period of transitional dentition there are used cast metal stump inlays, which are covered with plastic crowns after adjustment and fixation. Nevertheless, in children in the period of transitional dentition permanent teeth continue to “grow”, i.e. erupt. Considering this condition, one uses a drill to make a circular recess around the tooth stump at the level of the gingival margin during making stump metal inlays; the supraradical part of the inlay is modeled somewhat narrower than the diameter of the tooth stump. This makes it possible after complete eruption of the tooth and replacement of the cover crown to avoid additional preparation of the supraradical part of the metal stump, which is rather traumatic for the patient. Besides, preparation of the metal stump inlay is not advisable, because vibration and possible overheating may cause its further decementation. Slight additional preparation is restricted to hard dental tissues projecting above the stump and becoming bare after its complete eruption.

Stump inlays are used in the period of transitional dentition if 2/3 of the tooth crown is decayed and the pulp is devitalized. Decay of the crowns of the first permanent

molars is mainly caused by caries, and of the incisors – by trauma. Application of stump inlays in children in the period of transitional dentition under the condition of appropriate endodontic treatment before prosthetics does not cause pathological changes in the periapical tissues, does not hamper final formation of the roots, promotes adequate distribution of functional load on the affected tooth, and also allows replacing cover crowns after complete eruption of permanent teeth.

#### PROSTHETICS OF TEETH DEFECTS IN PERMANENT OCCLUSION

The period of permanent occlusion in 16-year-old children cannot be considered complete. Though all the teeth in the oral cavity are permanent, formation of the dento-gnathic apparatus and interocclusal relations, rearrangement of the temporo-mandibular joints are still in progress. Besides, there takes place active growth and formation of the facial skeleton, and with that there improves myodynamic balance of the masticatory muscles. This process develops against the background of general formation of the skeleton and all the systems of the human organism. In this aspect an important role is played by the condition of the oral cavity of the child, i.e. of the developing organism. Widespread caries affection of both temporary and permanent teeth among children and unsatisfactory condition of preventive work, and also considerable prevalence of teeth and dental arch defects and untimely dental prosthetics do not promote physiological conditions of development not only of the dento-gnathic apparatus, but of the child's organism in whole.

The permanent period of occlusion is not the final stage in dento-gnathic apparatus formation. Therefore preservation of all the permanent teeth and timely orthopedic treatment of teeth and dental arch defects must become the most important task of pedodontists.

In this consideration, development of efficient denture constructions for children in the period of permanent occlusion aimed to compensate teeth and dental arch defects is another important problem of pediatric dentistry.

If the crowns of teeth, mainly molars, are destroyed, there are widely used individual stamped metallic crowns. They are indicated if there is observed: defect of 1/3 of the tooth crown, poor fixation of fillings and their frequent replacement. More significant crown defects – up to 2/3 in a tooth with removed pulp – are replaced after appropriate endodontic treatment with pin inlays. After inlay fixation the molars are covered with metallic crowns.

As for the frontal teeth, mainly incisors, if 1/3 of their crown is destroyed by caries or a trauma, provided the pulp is living, semicrowns are cast. In this case the teeth are not prepared, the metallic part covers the oral surface of the tooth, the crown is fixed on the tooth with a composite material with simultaneous closing of the defect on the vestibular surface.

If there is no tooth crown, pin crowns-inlays are made.

It is the most difficult to apply dentures in children, whose hard dental tissues are considerably worn out, especially if this concerns all teeth in the period of permanent occlusion, which is observed in Steinton–Capdepon's syndrome. Root canals obliteration and root deformation hamper the use of pin crowns-inlays. The

risk of having such serious complications as perforation makes clinicians refuse from indicated denture constructions in this pathology.

V.P. Vozniuk offered a method of orthopedic treatment of children if the teeth are pathologically worn out. Thus, one clinically determines the condition of the hard dental tissues: the extent of wear, the type of wear (horizontal or vertical), topography and number of teeth with hard tissue attrition. X-ray examination allows studying the condition of teeth roots: their size and form, canal permeability, and also condition of the periapical tissues. Besides, there is detected teeth electrosensitivity and periodontal tissues endurance to vertical loads, i.e. VPD – the force of pain induction. Afterwards one builds up the tooth stump with the help of the composite material Charizma PPF or glass ionomer cement and the parapulpar dental pins produced by the firm Dental (Switzerland), Titanium Dentin Retention Pins. One marks places for parapulpar pins location on the occlusal surface of each worn tooth beforehand.

During placement of parapulpar pins one takes into account the size of the occlusal surface of the tooth, its group, functional capacity, safety zones (according to Abolmasov) for pin location.

In order to provide proper fixation of the supraradical composite part not less than three parapulpar pins are screwed on the worn surfaces, providing three-point planar fixation, i.e. in the form of a triangle, because two-point fixation, i.e. linear, is shortterm and ineffective. One screws three parapulpar pins on the incisors, four – on the canine teeth and premolars, five – on the lower molars, and four parapulpar pins – on the upper molars. After this one uses composite to model an artificial tooth stump.

If necessary, one carries out stepwise occlusion rise, building up the tooth stump with a composite taking into account interocclusal distance in the state of physiological rest.

The final stage of dental prosthetics is production of plastic dentures or dental whole cast combined bridges.

#### GENERAL CHARACTERISTIC OF PEDIATRIC DENTURES

In pediatric practice to restore the dental arches one uses such denture constructions: prophylactic removable and fixed, dental and cantilever bridges, removable laminar dentures, appliances-dentures with orthodontic devices. S.I. Tril classifies all dentures depending on their purpose of function into three groups: retaining, filling (restoring) and correcting.

Prophylactic holding appliances-dentures were first used by L.V. Ilyina-Markosian (1949) to prevent dento-gnathic deformities in children in case of early loss of temporary teeth. The author offered fixed prophylactic appliances, which included an abutment fixing crown, an intermediate part instead of a prematurely extracted tooth made in the form of a wedge with an occlusal or palatine plate. The intermediate part is not made to perform the masticatory function, at the same time it should sufficiently resist bending. It is made in the form of a smooth round or oval bar 3-4 mm thick. The direction of the rod is determined by the location of the opposing teeth. It should be situated opposite the fissures of teeth, which are found between their buccal and palatine tubercles, and fit these fissures during joining of teeth. The wedge with the occlusal plate is an immediate continuation of the bar. It is

a fork, which does not embrace the tooth (like a supporting clasp), but kind of pushes it. Lateral processes of the wedge are located on the buccal and lingual surfaces of the tooth and are 2.5-3 mm long, i.e. do not reach the place of the biggest convexity of the tooth. The occlusal plate is located on the masticatory surface of the abutment tooth in its natural recess. All the parts adjacent to the teeth enamel must be smooth and well polished. There should be no free spaces between them and the teeth not to promote food debris accumulation. Being light, strong and hygienic stainless steel is the best material to make fixed prophylactic appliances.

If a patient lost a couple of temporary teeth at once, J.F. Mink (1966) offered to use a passive bar to preserve place in the dental arch. For this purpose the doctor fixed metallic bands on the first permanent molars from one side and joined artificial teeth with a passive lingual bar by means of wire. E.M. Gofung offered using a fixed wedge in case of early extraction of a temporary molar. For this purpose one makes a crown or a ring for the first permanent molars and solders to it an activating wedge, which closely fits the anteriorly located tooth. The appliance is fixed on the first permanent molars with the help of movable nuts and a screw, which allows extending it as the jaw grows.

To prevent the development of dento-gnathic deformities in case of premature unilateral extraction of the second temporary molar V.P. Okushko (1975) recommends a fixed wedge with an activator. One makes a cap or a crown to fit the abutment tooth, solders to it an activating wedge, which tightly fits the first temporary molar.

K.N. Shamsiyev (1985) developed a fixed prophylactic appliance, which includes an abutment crown on the 6th tooth and an intermediate part made in the form of a unit-cast crown with a narrow masticatory surface passing into an occlusal plate and joining the medial teeth. Dental bridges are also used to replace DADs in children. Many scholars (L.V. Ilyina-Markosian, Y.N. Aleksandrova, G.T. Telebayev, 1974) believe that dental bridges with unilateral fixation are undesirable in pediatric practice because they hamper jaw growth. They recommend using in children only fixed dental bridges with unilateral fixation or extensible bridges. The authors think that dentures with bilateral fixation may be used in the region of frontal teeth only from 16-18 years, and in the region of lateral teeth – from 18-20 years.

K.N. Shamsiyev (1985) recommends replacing extensible dental bridges with monolithic ones at the age of 16 in the region of frontal teeth because at this age the growth of jaws is finished.

However, some experts disagree with these authors. Thus, Wittechman (1960) offers to replace DADs with dental bridges from the age of 12 years.

A.T. Busyhin (1961), H.K. Tiel (1966) recommend crown with a spring activator (2) on a model replacing DADs in the lateral part with dental bridges from the age of 14-15 years in order to prevent dento-gnathic apparatus deformities. E.Y. Vares (1964), K.N. Shamsiyev (1985), J.R. Mink (1966) offer replacing DADs in the lateral part with double-acting dental bridges from the age of 12-13 years, because after occlusion formation elongation of the jaws stops in the region of masticatory teeth. J.R. Mink (1966) notes that if it is difficult for a child to use a removable

denture in the period of temporary occlusion, there may be made a fixed double-acting dental bridge to preserve space in the frontal part.

E.L. Gotlieb (1966) offers to replace DADs in the frontal part with dental bridges with lateral fasteners on cementing bandages, and also to use lateral bails and loops. In this case the stability of artificial dentures is provided by connecting denture loops with the loops (or bails with bails and other attachments) on abutment teeth limiting the defect.

M. Trentalancia and coauthors (1986) describe a method of making the so-called Maryland fixed dentures. These are whole cast denture constructions, whose adjustment requires minimum teeth grinding (to 0.3 mm). They are fixed on composite materials by means of preliminary etching. Such dentures are used to replace DADs and also to consolidate the achieved results during orthodontic treatment, i.e. as retention appliances.

To achieve positive esthetic effect during DADs replacement in the frontal part with fixed denture constructions a number of techniques have been used. B.N. Zelisko (1988), Z.H. Zuyeva (1990), Th. Holste(1984), J. Bielski (1987) recommend making dental bridges by gluing artificial teeth to the teeth limiting the defect with the help of composite materials and preliminary etching avoiding teeth preparation.

Another important problem of dental bridges in children is their physiological property, i.e. creation of favorable conditions for the normal development of the dental, alveolar, and basal arches of the jaws. In this respect there have been offered many original denture constructions.

Thus, L.V. Ilyina-Markosian (1948) was the first to use an extensible dental bridge. She recommended making it in the absence of 2-5 teeth in the frontal part if the defect is interrupted with at least one root, which can be used to support the denture.

K.N. Shamsiyev (1985) developed an extensible dental bridge for both jaws with 2-4 incisors missing for children aged 16 years (Fig. 6.6). It is supported by metallic crowns, facets. The extensible part is in the thickness of the denture itself. The author recommends insignificant preparation of the abutment teeth.

One uses a sheet of stainless steel to stamp or cast a protective shield, a facet, then one uses steel wire to make a tetragonal pin 1.5 mm thick, 2 mm wide, it is ground and polished; a bushing is made of steel plate by the form of the pin. The length of the pin and bushing on each side must make not less than half the length of the protective part of the denture. When a crown is soldered with a protective plate, the bushing is soldered parallel to the bar and filled with plaster (not to let plastic in). The denture framework is divided along the midline into two equal parts, both of them are mounted on the model and the labial part is modeled in wax.

One uses a featheredge to cut the wax along the separation line of the protective shield. The denture is removed from the model, the bushing entry is cleared from wax, and the wax is replaced with plastic. After the denture is polished one removes plaster from the bushing and introduces the pin. Both parts of the denture are joined by means of the pin, freely sliding within the bushing, afterwards they are simultaneously cemented on the abutment teeth.



O.Y. Kalpakiants, D.V. Olenchich, A.B. Stamo (1987) made extensible dental bridges with sliding hinges to replace DADs both in the frontal and lateral parts.

According to the authors, such dentures as much as possible restore the masticatory function, transfer masticatory pressure through the periodontium, prevent the development of maxillofacial deformities and do not hamper the growth and development of jaws.

Tril (1992) offered an extensible dental bridge, which includes abutment crowns or rings and an extensible intermediate part made in the form of a facet.

**Denture-making technique.** Metallic crowns are made for non-prepared abutment teeth. After crown adjustment the doctor makes an impression, casts models.

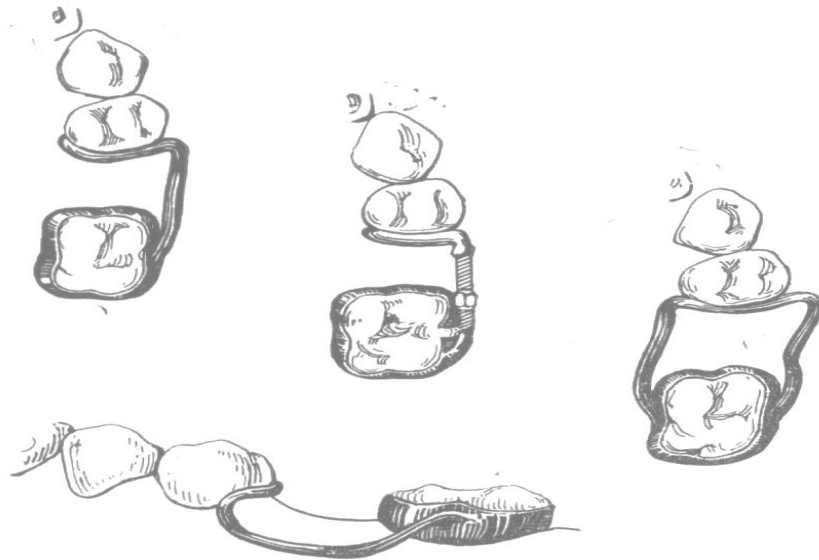
A rounded pin is soldered to the approximal surface of one of the crowns, the pin is 1.2-1.5 mm in diameter corresponding to the size of the defect. Then the intermediate part is modeled in wax, inside it a pin impression is obtained; the pin is covered with adhesive plaster all around. A fireproof rod of corresponding dimensions is inserted into the pin bed protruding by 4-5 mm; then the denture is sent to the foundry. After the intermediate part is cast, the fireproof rod is taken out of it and soldered to the approximal surface of the second abutment crown. In the clinic the doctor adjusts and joins the surfaces of the pin and the bed and covers the abutment teeth. The denture framework is checked in the oral cavity. Later on the facet is coated, afterwards the denture is checked, fit and fixed on the abutment teeth. A dental bridge of this construction is stable and provides two degrees of freedom for both halves.

Tril (1991) developed a whole cast dental bridge, whose installation does not require preparation of the abutment teeth.

**Denture-making technique.** One determines periodontium condition and defect topography clinically and radiologically. Impressions are obtained (working double-layered and auxiliary), central occlusion is fixed. Then models are cast in superplaster. With the help of a parallelometer one finds the terminal line of the abutment crowns on the working model. Each crown is divided into two parts – occlusal and retention, thus determining the mode of denture introduction. After this the working model is duplicated and cast in fireproof mass, the necessary land-marks are marked. The models are placed in the articulator in centric relation and the doctor models a wax reproduction of the framework of a whole cast denture. The vestibular surface of the abutment crowns is left open, and in the cervical region of the approximal surfaces one makes a triangular ledge within the retention part of the crowns determined with the help of a parallelometer. The approximal and incisal surfaces of teeth are covered completely, and masticatory – partially. One casts the framework of a whole cast dental bridge in cobalt-chromium alloy on a fireproof model, fits it in the oral cavity, faces the intermediate part, and then fixes on the abutment crowns with a composite or a light curing material.

We use the described technique in the clinic of prosthetic dentistry and orthodontics in patients with DADs at the age of 11-18 years. It allows avoiding preparation of the hard tissues of the abutment teeth, i.e. making the manipulations

less traumatic, preventing complications in the tooth (chemical and thermal injuries, infection), improving the quality of whole cast prosthetics, achieving better esthetic effect. To replace minor defects in the lateral section of the dental arches T.V. Sharova (1980) offered a removable dental bridge fixed on retaining, abutment or abutment-retaining cast clasps. These dentures have considerable advantages over removable ones because they occupy a minimum prosthetic field, consequently, have no negative influence on the supporting tissues. Nevertheless, these dentures are still not widely applied in pediatric practice because of their disadvantages, notably: insufficient fixation, overload of the tissues of the prosthetic field, the risk of swallowing the denture, etc.



**Fig. Prophylactic dentures at the premature loss of teeth**

**Materials for self-control:**

A. Tasks for self-control (tables, diagrams, drawings, graphs):

- to sketch in the album the drawings with DADs classification;
- to sketch in the album the drawings with different types of dentures for DADs removing.

B. Tasks for self-control:

1. What violations are forming as a result of early loss of deciduous teeth without preventive prosthodontics?

all answers are correct

impaired integrity of the dentition

the establishment of the height of the bite delayed growth of the jaw area

the formation of pathologic occlusion

appear harmful tongue habits

2. To restore hard teeth tissues in stage I of destruction in the mixed dentition period is used:

thin-walled crowns

inlays

veneers  
cap-faceted crowns  
all answers are correct

3. To restore hard teeth tissues in stage I of destruction in the permanent dentition period is used:

all answers are correct

veneers  
inlays  
different types of artificial crowns  
aesthetic restoration

4. The peculiarities of dental crowns in children include:

all answers are correct

physiological separation  
the crown must not go into the gingival groove  
use of thin-walled shells  
teeth dissect only in the region of the cutting edges and cusps of posterior teeth

5. By appointment of the crown are divided into:

all answers are correct

fixing  
restoring  
splinting  
supporting

6. Permanent artificial crowns is used for:

the reconstruction of defects of hard tissues of teeth  
fixing orthodontic devices  
splinting of mobile teeth  
the contents of medicines  
coating of teeth, which serve as a support for the clasps

7. Fixation by M. A. Napadov it is advisable to apply under the following conditions:

low crowns of the teeth  
the high crowns of the teeth  
a pronounced equator  
when malocclusion combining with a dentition defect  
the correct answer is no

8. The child of 10 years is specified multiple adentia – there are no temporary molars in both jaws. What prosthesis should be used?

sliding partial plate dentures  
sliding bridges dentures

maintain-spacer dentures  
dentures  
in prosthetics there is no need

9. What is the design of the prosthesis shown the boy is 10 years, which has removed 11,21 teeth, the space between the lateral incisors is 10-12 mm.

sliding removable laminar prosthesis

bridge

the prosthetic implant after the age of 18 years

denture

a removable prosthesis with artificial teeth 11,21

10. To the emergence of some anomalies of the dentition can result in the removal of 55, 54, 64, 65 teeth in a child of 7 years?

shortening of the dentition

the extension of the dentition

elongation of dentition

the growth delaying

the narrowing of the dentition

11. Within what time removable laminar denture needs replacement in a patient 7 years?

6-8 months

12-16 months

16-20 months

20-24 months

16-18 months

12. Determine the nature of the damage in stage III of the destruction of the teeth and dentition:

defects in the dentition length of one or two teeth

significant or complete defect of the tooth crown with damage to the pulp

partial defect of the tooth crown without damaging the pulp

defects of dentition large extent, the complete absence of teeth

intact teeth

13. Determine the nature of the damage in IV stages of tooth decay and dentition:

defects of dentition large extent, the complete absence of teeth

significant or complete defect of the tooth crown with damage to the pulp

defects in the dentition length of one or two teeth

partial defect of the tooth crown without damaging the pulp

intact teeth

14. Determine the nature of the damage in stage I the destruction of the teeth and

dentition:

partial defect of the tooth crown without damaging the pulp

significant or complete defect of the tooth crown with damage to the pulp

defects in the dentition length of one or two teeth

defects of dentition large extent, the complete absence of teeth

intact teeth

15. Define tactic of doctor, if 7-year-old revealed that the temporary molars of the upper dentition removed, the lower incisors are in contact with the mucosa of the palate.

prosthetics and orthodontic treatment

replacement of defects of the upper dentition

treatment of deep bite

no need treatment

dynamic monitoring until eruption of permanent teeth

16. What changes in the dentoalveolar region can arise after the removal of the 36 tooth in a child 12 years with orthognathic bite?

all answers are correct

mesial displacement of 37 and the distal displacement 34

teeth convergence of crowns of teeth 37 and 34

will not have significant changes

appears the spaces between the frontal teeth

17. When you want to develop a prosthetic baby 4 years with unilateral terminal defect of the upper dentition length of tooth 2?

before the eruption of the first permanent molars

after determining the defect of dentition

in 5 years

in 7 years

in 8 years

18. What prosthesis should be used in a child of 10 years with no temporary molars on both jaws?

sliding partial lamellar dentures

bridges sliding dentures

sliding prostheses

prosthesis - spacers

in prosthetics, there is no need

19. What is the design of the prosthesis shows a boy of 10 years with remote 11, 21 teeth, the space between the lateral incisor is 10-12 mm.

sliding removable laminar prosthesis

a removable prosthesis with artificial teeth 11,21

bridges sliding dentures  
prosthetics on implants after the age of 18 years  
denture

20. Select the design of the prosthesis to a child 12 years of age, who is crowding 12, 11, 21 teeth, dentition defect in the area 22 of the tooth on the panoramic radiography is no rudiment of the tooth 22.

sliding removable partial laminar  
denture bridges with unilateral fixation  
prosthesis-spacer  
sliding bridge  
bridge denture with bilateral fixation

21. To the emergence of some anomalies of the dentition can result in early removal of 55, 54, 64, the teeth of the child 7 years?

shortening of the dentition  
the extension of the dentition  
elongation of dentition  
the growth delaying  
the narrowing of the dentition

22. What construction of prosthesis is desirable to make 11-year-old girl with traumatic defect of the crown 21 of tooth?

restorative crown on a post-and-core tab  
tab  
thin-wall crown  
cap – faceted crown.  
pin tooth

23. Rise to some pathology in the vertical plane may result in early removal of deciduous molars in both jaws have a child of 7 years?

reducing the height of the bite  
shortening of the dentition  
the extension of the dentition  
elongation of dentition  
the narrowing of the dentition

24. What construction of prosthesis is recommended for children 5 years of age with bilateral end defect of the dentition of both jaws?

sliding partial lamellar denture  
denture  
bridge  
full removable laminar prosthesis  
in prosthetics, there is no need

25. Select rational design of a dental prosthesis to a child 14 years of age with a full broke off of the 11 tooth crown, root of tooth 11 protrudes 2-3 mm above the level of the gums, and the radiographs revealed no pathology.

pin tooth

ceramic veneers

bridge

a removable partial denture

denture

26. During a routine inspection in a child 14 years of age revealed the absence of 53 and 63 teeth, gaps the size of 8 mm. Determine the tactics of doctor?

dynamic monitoring until eruption of teeth 13 and 23

manufacturing of removable partial denture

manufacturing of dental bridges

manufacturing preventive prosthesis-spacer

manufacturing micro-dentures

27. What method of treatment will help normalize the occlusion of the patient 28 years old with secondary adentia 34 and 44 teeth and dentoalveolar elongation of 14 and 24 teeth on 1/3 of the height of the crowns.

instrumental and prosthetic

prosthetic

surgical

instrumental and surgical

all answers are correct

28. What impression material should be used in a patient 8 years for a removable denture?

alginate

thermoplastic

cristalizare

silicone

tocology

29. Within what time require replacement of a removable partial prosthesis in a patient 7 years?

6-8 months

12-16 months

16-20 months

20-24 months

16-18 months

30. Some preventive design rational to make the girl of 5 years missing 64 and 65 of

the teeth?  
sliding removable partial denture  
interdental prosthesis-spacer  
dentures  
bridge  
a removable partial denture

31. Select the most optimal design for replacement of defect of dentition of a teenager 17 years with edentulism 15 tooth.

adhesive bridge  
metal-ceramic bridge  
metal-plastic bridge  
plastic bridge  
cantilever prosthesis

32. What assistance should be provided to patient 12, who lost 11, 12, 21,22 teeth 2 years ago due to injury, space for 4 incisors enough.

making removable appliance-prosthesis  
the manufacturing of partial removable denture  
the manufacturing of partial removable prosthesis  
the production of immediate dentures  
dentures with implants

33. Select a rational design of the prosthesis have a 17-year-old with the destruction of more than 2/3 of the crowns of 12, 11, 21 and 22 teeth. On the radiograph: root canals are sealed, the pathological changes are absent.

crowns on a post-and-core tab  
veneers  
pin tooth  
inlays  
metal-ceramic crowns

## **Literature**

### **Main:**

1. Flis P.S. and coauthors “Pediatric Dental Prosthetics”– Kyiv, MEDICINE, 2012, – 275p.
2. Golovko N.V. et al. Orthodontics. Occlusion development, diagnostic of malocclusion, orthodontical diagnosis. Poltava,– 2008, – 95p.

### **Additional:**

1. Pubmed. – Режим доступу: <http://www.ncbi.nlm.nih.gov/pubmed/>
2. Google Scholar – Режим доступу: <https://scholar.google.com.ua/>
3. BASE. – Режим доступу: <https://www.base-search.net/>
4. European Journal of Orthodontics. – Mode of access: <https://academic.oup.com/ejo>



5. Angle Orthodontist. – Mode of access: <http://www.angle.org/?code=angf-site>