Ukrainian Medical Dental Academy
Department of Propedeutic of Prosthetic Dentistry

Lecture on the theme:
Modern methods of prosthesis fixed prosthetic constructions

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Poltava 2021

Lecture plan

- 1. Relevance of the topic.
- 2. Composition and properties of porcelain masses.
- 3. Rationale for the use of fixed metal prostheses.
- 4. Indications and contraindications for the use of metal-ceramic fixed prostheses.
- 5. Clinical and technological stages of production of metal-ceramic fixed prostheses.
- 6. Features of determining the color of natural teeth.
- 7. Features of preparation of hard tooth tissues for metal-ceramic fixed structures with the formation of a cervical ledge.
- 8. Errors and complications that may arise when using metal-ceramic prostheses.
- 9. Basic and auxiliary materials for the manufacture of metal-ceramic fixed prostheses.
- 10. Advantages and disadvantages of various one-piece fixed prostheses in comparative characteristics.

Relevance of the topic

- The main task of modern orthopedic dentistry is the introduction of new technologies and materials in dental practice, which could provide the most complete restoration of the integrity of teeth and dentition, functionality, inertia and aesthetics of which could satisfy the most demanding doctors and patients. Analysis of literary sources indicates that the leading place in fixed prosthetics is occupied by metal-ceramic structures, which, in terms of their functional and aesthetic properties, do not have the drawbacks of stamped-brazed technologies, but their manufacture is a laborious and complex process that requires a special professional from a doctor and dental technician. approach at all clinical and laboratory stages of manufacture. As well as the introduction into orthopedic dentistry, such areas as veneers, lumineers, metal-free ceramics and a combination of prosthetics with implantology, develops a modern method of prosthetics.

Composition and properties of porcelain masses

- First porcelain as a material for dental prostheses applied R.Fauchard in 1728 by metal enameling, developed at the time.
- **Porcelain** is a product of balanced parts of mineral origin such as kaolin, quartz, feldspar, metal oxides (dyes), fluxes.
- **Kaolin** (white clay), together with quartz to form a solid base and porcelain give it opacity.
- **Quartz** (silica Si2) **-** causes hardness and chemical resistance.
- **Feldspar** (silicate K, Na, Ca, Al) determines a dense structure and adds transparency.
- The crystalline phase of fired porcelain turns into a product - **porcelain leucite (K2O-Al2O3-4Si2).**

Indications for the use of metal-ceramic fixed prostheses

- destruction or traumatic breakage of a significant part of the crown of the tooth, when it is impossible to restore it with the help of filling materials or inlays;
- anatomy of the development and position of the anterior teeth, when it is impossible to apply orthodontic treatment;
- pathological abrasion of hard tissues of teeth;
- non-carious lesions of hard dental tissues (fluorosis, wedge-shaped defects, enamel and dentin hypoplasia);
- aesthetic defect in the crowns of natural teeth (loss of gloss, discoloration);
- the presence of unaesthetic designs that meet aesthetic or functional requirements;
- the presence of defects in the dentition, for which bridge structures can be used.

Contraindications for the use of metal-ceramic fixed prostheses

There are **absolute** and **relative** contraindications.

To absolute contraindications should be attributed:

- Teeth with living pulp in children and adolescents.
- Severe periodontitis.

Relative contraindications to the use of cermet structures :

- Bite anomalies with deep incisor overlap.
- Pathological abrasion of hard tissues of teeth.
- Parafunction of the chewing muscles (bruxism).
- Insufficient height of the abutment crowns of natural teeth, especially in the presence of significant defects in the dentition.

Clinical and technological stages of production of metal-ceramic fixed prostheses

The sequential stages of the manufacture of metal-ceramic structures consist of the following sequential clinical manipulations:

- Examination of the oral cavity and therapeutic sanitation of the hard tissues of the tooth, if indicated.
- Taking diagnostic impressions and obtaining models on which future prosthetics are planned.
- Tooth shade determination.
- Retraction of the gingival groove and preparation of teeth with the formation of a cervical shoulder.
- Obtaining a two-layer impression.
- Making and strengthening of temporary crowns on prepared teeth.
- Determination of central occlusion.
- Dissection of a one-piece metal frame and its correction.
- Preparation of metal-ceramic bridge construction.
- Fixation of the finished metal-ceramic bridge structure with temporary or permanent cement according to indications.
- A recommendation to the patient about the care of this design.

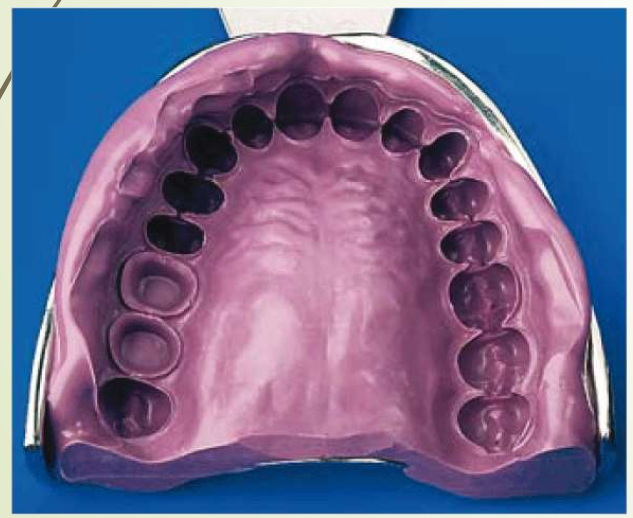
Preparation of teeth for the manufacture of metal-ceramic bridges

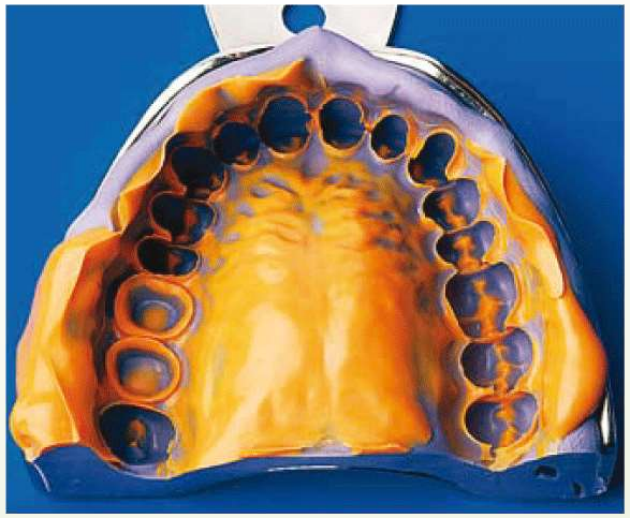
Metal-ceramic crowns consist of a metal framework and ceramics. The framework provides strength to the crown. Metal ceramics is considered the most durable prosthetics option among all aesthetic crowns, precisely because of the metal. It takes the brunt of it, ceramics mainly provide aesthetics. The minimum metal thickness should be 0.4 mm. The minimum thickness of the ceramic layer is 0.8 mm. The thickness of the cermet can be from 1.1 mm. In reality, most often from 1.1 to 1.5 mm. Authors' opinions vary up or down within the indicated ranges.

In order to avoid injury or pulp burns, it is necessary to step back 1 mm from the nervous tissue (therefore, knowledge of anatomy and wall thickness is important). It is imperative to work with a water-cooled handpiece, carefully, interrupting during work.

Getting a two-layer impression

- An impression for the manufacture of a metal-ceramic bridge structure and a crown must accurately reproduce the relief of the prosthetic bed and convey the smallest details of the relationship between the crown of the tooth and adjacent tissues (marginal periodontium, hard tooth tissues in the cervical area, gingival margin and gingival groove).
- The technique for obtaining a two-layer impression consists in gingival retraction, in taking an approximate (base) impression - the first layer, obtaining a refined impression with a correcting second layer, silicone impression materials.



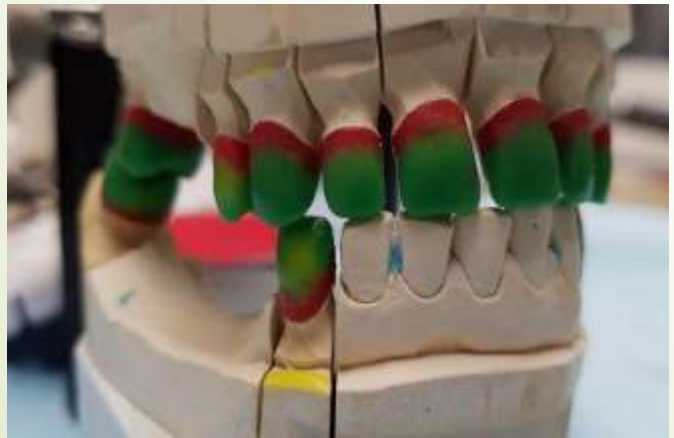


Making and strengthening of temporary crowns on prepared teeth

- After taking the impression, the prepared teeth must be covered with temporary provisional crowns. This is necessary to prevent the possibility of displacement of teeth without contact. In addition, teeth with living pulp react sharply to thermal and chemical irritants and can easily become infected, which can lead to inflammation of the dental pulp.

Solid metal frame fits

- After receiving the metal frame for ceramics, the dental technician carefully checks it on the model before fitting it, and carries out its mechanical processing, controlling it with a micrometer. It should not have pores, cavities, cracks or deformations. The accuracy of the fit to the plaster pulp of the tooth is also checked in the clinic.
- The one-piece metal frame should be freely applied to the abutment teeth and removed. In cases where the cast framework is forcefully applied to the prepared teeth, it is necessary to carry out a consistent correction. In the case when only the vestibular surface is faced on the cermet structure, the occlusal surface of the metal frame should be in contact with the antagonist teeth, but at the same time not separate the bite.

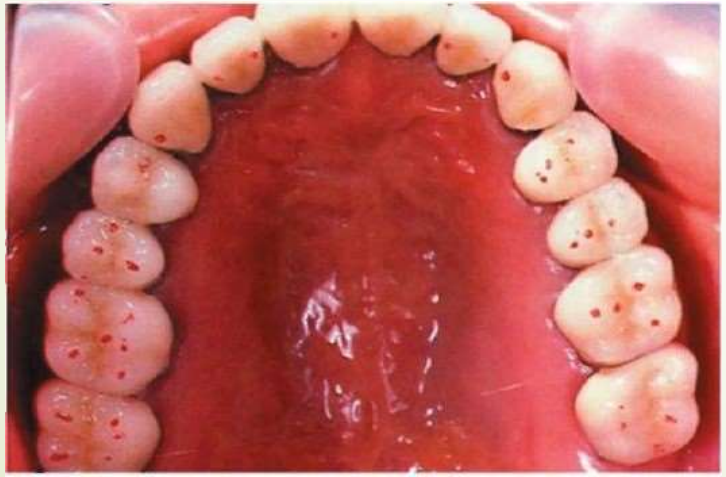


Determination of the color of ceramic cladding

- The color of the ceramic veneer should be checked together with the dental technician, in natural daylight, by comparing the color of adjacent teeth or antagonists with a color scale of standard or individual shades, taking into account the wishes of the patient.

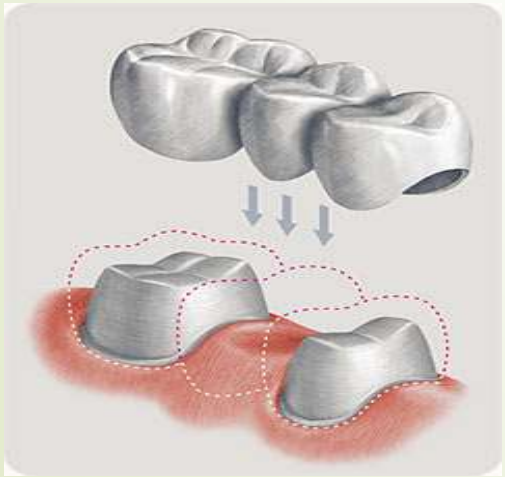
Checking the sintered structure

- This is a rather important clinical stage in the manufacture of a metal-ceramic bridge prosthesis. First of all, the supporting parts of the prosthesis should be freely put on the prepared teeth. At the same time, the excess porcelain layer is detected (visually or with the help of carbon paper) and grind off. The procedure is repeated until the structure is easily put on the abutment teeth. After applying the structure, you need to check the color and shape of the porcelain cladding. The stage ends with the following: to adjust the metal-ceramic structure by correcting the interocclusal relationship with antagonists and, if necessary, tint in the technical conditions and give it a heat treatment.



Fixation of the finished metal-ceramic bridge with permanent cement

- Strengthening of a metal-ceramic bridge and a crown on a tooth is carried out by the traditional method, observing certain rules, when fixing glass ionomer cement in the recommendations of the manufacturer. The patient is explained the need for a gentle regimen in the first 2-3 hours after cementing the bridges, do not eat, keep the teeth closed and do not make lateral movements, avoid excessive load, which contributes to high-quality crystallization of the cement. This is especially true for persons who have relative contraindications and who have received preliminary preparation of the dentition.



Modern types of fixed prosthetics

At the present time, the classic fixed orthopedic treatment has been replaced by a new generation of orthopedic structures, which are more durable and have a more pronounced aesthetic effect, but this does not negate the fact that the classic type of fixed prosthetics is also the basis and support of quality treatment, which is in no way inferior in the quality and functionality of today's orthopedic modernity.

We can attribute to modern fixed prosthetics

- Zirconium. This is the most modern type of veneer. They are made from zirconium dioxide and ceramics - this combination gives the plates amazing strength combined with aesthetics. The technology for creating zirconium onlays is very complicated, and not everyone in our country owns it - 3D milling requires not only expensive equipment, but also experience. Of course, all this affects the price. But they will last longer, in some cases - up to 20 years. Moreover, over all these years, they do not deform and do not change color.

Представители керамических масс

HeraCeram - ceramic mass for classic metal alloys for ceramic cladding.

The manufacturer Espident carries out extensive research and implementation in the field of dental ceramics. So, for example, sets are produced for execution with special ceramic materials "Carmen" for precious alloys.

Shofu Vintage MP is an ultra-fine microceramic for installing veneers over any standard, high-temperature alloys for cermet, and for noble, semi-noble and non-noble, with a recommended coefficient of thermal expansion from 13.6 to 15.2 x 10-6K-1.

Представители стеклоиономерных цементов

CX-Plus Sofu is a high quality Japanese glass ionomer cement for the luting of orthopedic work. CX Plus Shofu dental cement is designed for fixing crowns and bridges, onlays, inlays, extended and orthodontic structures.

Ketac Cem radiopaque is a radiopaque glass ionomer cement for the fixation of inlays, onlays, crowns, bridges, stump inlays made of metals, cermets or zirconium systems.

Breeze is a high-strength, dual-curing cement for the permanent anchorage of prosthetics. This cement was developed with the aim of completely facilitating and increasing the speed of the dentist's work without compromising the quality and aesthetics of the result.

Структурно-логическая схема содержания темы: Клинический этапы

Clinical stages of the manufacture of metal-ceramic structures

Indications and contraindications for manufacturing

Color definition

Features of preparation of hard tooth tissues

Obtaining a two-layer working print

Inspection and correction of the metal frame

Структурно-логическая схема содержания темы: Технологический этап

Technological stages of production of cermet structures

Getting a collapsible combined model

Features of making a wax reproduction of a metal frame

Mechanical treatment, degassing and oxygenation of the metal frame

Final processing of sintered structures

Porcelain layering, firing

THANKS FOR ATTENTION!