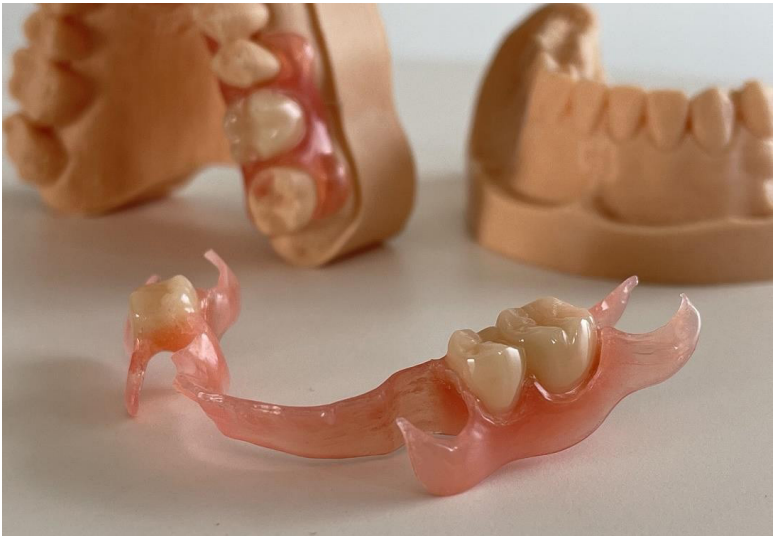
MINISTRY OF HEALTH OF THE REPUBLIC OF MOLDOVA
„NICOLAE TESTEMIȚANU" STATE UNIVERSITY OF MEDICINE AND PHARMACY

„Pavel Godoroja" Department of Dental Propaedeutics

SVETLANA MELNIC

CHARACTERISTICS OF FLEXIBLE REMOVABLE PARTIAL DENTURES

Methodical guide for second year students, fourth semester
Faculty of Dentistry



CHIȘINĂU, 2025

CZU 616.314-77(076.5)
M 56

Approved by *Nicolae Testemițanu* SUMPh
Quality Management Councils *verbal process nr*. 05 from 12.02.2025

Author:
Svetlana Melnic, MD PhD, university assistant

Reviewers:
Diana Uncuța, MD DhMS, associate professor
Olga Cheptanaru, MD PhD, associate professor

Translator:
Liliana Panciuc

Computer processing:
Ludmila Iliina

DESCRIEREA CIP A CAMEREI NAȚIONALE A CĂRȚII DIN REPUBLICA MOLDOVA

Melnic, Svetlana.
Characteristics of flexible removable partial dentures : Methodical guide for second years students, fourth semester Faculty of Dentistry / Svetlana Melnic ; translator: Liliana Panciuc ; Ministry of Health of the Republic of Moldova "Nicolae Testemițanu" State University of Medicine and Pharmacy, "Pavel Godoroja" Department of Dental Propaedeutics. – Chișinău : [S. n.], 2025 (Tipografia Nr. 1). – 43 p. : fig. color.

Referințe bibliogr.: p. 41-43 (33 tit.). – [50] ex.

ISBN 978-9975-57-387-0.

616.314-77(076.5)

M 56

CONTENTS

INTRODUCTION

Partial edentulism, particularly extensive ones, have been a concern for humanity since ancient times. Numerous old manuscripts describe modern treatment procedures and emphasize the indispensable role of prosthodontics for edentulous patients. Tooth loss, whether due to trauma or various dental diseases, affects the psychological well-being of patients and disrupts their aesthetics, phonetics, and functional occlusion.

The dental prosthetist, in their professional activity, faces multiple clinical situations, such as partial edentations, subtotal edentations, and others. These cases require correct diagnosis and subsequent planning of individualized treatment plans for each patient. This approach aims to promote dynamic improvement and achieve a favorable prognosis.

To restore the integrity of dental arches, the use of partial dentures allows for a wider application of flexible dentures. These prostheses more fully and effectively meet the functional and aesthetic requirements of the stomatognathic system. Nylon, as a base material for IRPDs, serves as an alternative in specific clinical situations, especially for patients allergic to the polymethacrylate monomer.

Unlike other types of dentures, *OIRPD* (odontotechnology of injected removable partial dentures) is a rapidly evolving field. Artificial teeth have also undergone continuous development over the centuries, progressing from carved blocks of various materials (wood, bone, ivory) to the individualized teeth. This evolution took place over a period of 300 years (1678-1946), during which ceramic teeth dominated. It was during this time that Giuseppangelo Fonzi introduced individualized ceramic teeth, namely single-color porcelain tubular teeth produced on an industrial scale.

This methodical guide focuses on training students in planning and creating injected removable partial dentures. It covers the types of RPDs, the clinical and technical stages of creating FRPDs, which dentists must be familiar with, and the strict adherence to all indications and contraindications for removable dentures. The sequential process of creating flexible removable dentures plays a crucial role in ensuring the success of prosthetic treatment. Intended for second-year students of dentistry, this guide aims to enhance the teaching and learning process and improve the acquisition of skills in removable prosthetic techniques. These techniques are fundamental in the training of dental specialists.

UNIT: CHARACTERISTICS OF FLEXIBLE REMOVABLE PARTIAL DENTURE

Purpose of the work: To acquire knowledge about the indications for therapy with flexible removable partial dentures, the types of flexible removable partial dentures, and the clinical-technical stages involved in FRPD fabrication.

Duration and type of activity: The material is covered over 8 academic hours, including: a theoretical course (1 hour), seminars (2 hours), practical lessons (2 hours), and individual work (3 hours).

Place of work: Study room and dental technique laboratory.

Students will be introduced to models with partially edentulous prosthetic fields; they will learn to determine indications for treatment with flexible removable partial dentures, will choose impression trays, will take impressions, and will create models.

At the end of the practical lesson/seminar, the student will acquire the following skills: to select the impression tray, prepare the impression material, take impressions from the simulator model, and create medical plaster models.

Methods and materials: The theoretical material is delivered through courses, lectures, and seminars. During the seminar/practical work and lectures, the following forms of training are used: face-to-face instruction, individual activities, brainstorming sessions, group discussions, case simulations, and case studies. The didactic materials include dentistry textbooks available in the university library, PowerPoint presentations, visual thinking tools (diagrams, tables, etc.), e- resources, as well as national and international dental websites.

Work plan:

Discussions on the topic.

Demonstration of models with a partially edentulous prosthetic field, determination of indications for treatment with flexible removable partial dentures, choice of impression tray, impression taking, and model creation.

1. Selection of the impression tray, preparation of the impression material, taking impressions from the simulator model, and creating plaster models.
2. Revision.

SELF-ASSESSMENT QUESTIONS

1. Characteristics of flexible removable partial denture.
2. Characteristics of the anchoring, maintenance, and stabilization components of flexible removable partial denture.
3. Indications for therapy of partial edentulism with flexible removable partial denture.
4. Classifications of impression materials. Impressions. Criteria for impression classification.
5. Impression trays. Characteristics and types of anatomical impressions for flexible removable partial denture.
6. Model making technique. Materials and requirements for manufacturing the flexible removable partial denture.
7. Clinical and laboratory stages of manufacturing flexible removable partial denture.
8. Artificial teeth. Types and commercial packaging.
9. Rules for mounting artificial acrylic teeth in maxillary and mandibular flexible removable partial denture.
10. Modern acrylic injection technologies.
11. Chemoplastic injection under hot polymerization in a dry environment.
12. Chemoplastic injection under cold polymerization.
13. Unpacking flexible removable partial denture.
14. Processing and polishing of flexible removable partial denture.

LIST OF ABBREVIATIONS

IA – injectable acrylic
TMJ – temporomandibular joint
VDO – vertical dimension of occlusion
UHMWPE – ultra-high-molecular-weight polyethylene (UHMWPE, UHMW) / high-modulus polyethylene
PD – partial denture
FPD – flexible partial denture
RPD – removable partial denture
ARPD – acrylic removable partial denture
FRPDs – flexible removable partial dentures
IRPD- injected removable partial denture
AR – acrylic resin
FRPR – flexible removable prosthetic restoration
SR – superpolyamide resin
CRR – centric relation record

GLOSSARY

Dental prosthetics (prosthodontics) is a branch of dental medicine that focuses on restoring and maintaining patient's oral functions, comfort, and aesthetics, as well as the overall health. This is achieved by restoring or replacing natural teeth and oral/maxillary structures with artificial prosthetic components.

Removable prosthodontics is a field of prosthetics that involves replacing teeth and adjacent structures in patients who are totally or partially edentulous with artificial substitutes that can be removed from the oral cavity.

Dental prostheses, also known as dentures, are physical structures made of alloplastic materials (metals, ceramics, polymers). They are used in prosthodontics to restore tissues or segments that have been pathologically modified or lost, both morphologically and functionally. **Removable partial dentures** are dental prostheses designed to replace missing teeth within a partially edentulous arch.

Removable partial restorations convey masticatory pressures to the bone through different support mechanisms. These mechanisms include mucosa-bone support, where pressure is conveyed solely through the mucosa and alveolar ridges; dental-periodontal support, where pressure is distributed through both teeth and the periodontium; and mixed support, which combines pressure transmission through the mucosa and bone.

CHARACTERISTICS OF FLEXIBLE REMOVABLE PARTIAL DENTURE

Flexible removable partial dentures (FRPD) represent an aesthetically pleasing, highly practical, and effective solution for partial tooth replacement, offering gum support without causing trauma to adjacent natural teeth. These dentures, also known as elastic dental prostheses, are made through thermoplastic injection, ensuring enhanced accuracy and aesthetic appeal while being non-allergenic. The introduction of these materials has revolutionized RPD technology, delivering outstanding aesthetics and biocompatibility (Figure 1).

*The **flexible removable partial denture (FRPD)** comprises the following components:*

- base and saddles (Figure 1a)
- artificial dental arch (Figure 1b)
- maintenance, support, and stabilization components (Figure 1c)

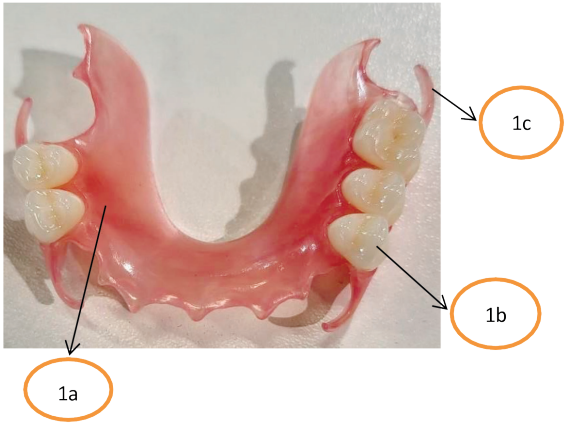


Fig. 1. FRPD components [19]

Components of Flexible Removable Partial Dentures

FRPD bases provide the connection between the saddles. These bases exhibit specific clinical and technical characteristics: they are resistant to mechanical stress, non-deformable, and can protect the marginal periodontium if appropriately distanced from it. Removable denture

components made from injectable acrylic resins feature homogeneous bases, ensuring optimal tissue compatibility and minimizing mucosal irritation, largely due to their reduced residual monomer content.

FRPD saddles are components that cover the residual alveolar ridges, restoring the volume and shape of the edentulous ridges affected by resorption and atrophy. These saddles provide fixation and support for artificial teeth, transmitting occlusal pressure to the mucosal-osseous support and improving retention**.** Each saddle features a mucosal face, a polished external face, and two ridges: a vestibular ridge and an oral ridge.

The external (oral) face is where the artificial teeth are ideally fixed, typically corresponding to the center of the ridge. In maxillary dentures, the oral ridge extends along its base, while in mandibular dentures, it extends nearly close to the lingual fold, following the internal oblique line.

The mucosal (internal) face of the saddle directly contacts the mucosa of the residual alveolar ridge. The vestibular edges of the saddles align with the mucosa level in the neutral zone. Oral edges are continuous with the denture base, palatal plate, or lingual plate. The vestibular slope extends to the level of the passive-mobile mucosa in both the maxilla and mandible. In the frontal area, the vestibular ridge may be absent in cases of progeny. The vestibular ridge alters the position of the upper lip, which is typically shorter in these patients. In terminal edentulous areas, the saddles extend distally to cover the maxillary tuberosity and the fixed portion of the piriform tubercle **(**depending on the insertion of the pterygo-mandibular ligament). The number of saddles corresponds to the number of edentulous gaps.

The artificial dental arch comprises artificial teeth that replace the missing teeth and supporting structures. The mechanical resistance of artificial teeth is crucial in the treatment of extended partial edentations using removable dentures, as it directly affects the distribution of occlusal contacts.

The components for maintenance, support, and stabilization include physiognomic dental clasps, which can be pink or white depending on the clinical situation.

CHARACTERISTICS OF THE ANCHORING, MAINTENANCE, AND STABILIZATION COMPONENTS OF FRPD

These dentures, made from non-conventional materials, enable the replacement of metal clasps with physiognomic ones, leading to the emergence of a range of materials collectively known as *EPL (Esthetic Partial Line).*

The main advantages of these materials include:

- special aesthetics for flexible removable partial dentures;
- use of injection technologies;
- good resistance;
- close adaptation;
- lightweight dentures;
- a wide variety of adaptable materials suitable for different clinical cases.

The main EPL materials are:

1. ***EsthetiClasp™:*** This material allows for the creation of aesthetic clasps that match the color of natural teeth.
2. ***Esthetic – Flex™:*** An extremely flexible and practically unbreakable thermoplastic material that ensures comfort and offers special aesthetics. It is available in VITA shades or pink colors.
3. ***Esthetic – Flex Duet™***: This material combines the strength of the product with the comfort provided by the *Esthetic-Flex* system clasps.

Dental clasps, serving as anchoring, maintenance, and stabilization componenets of flexible removable partial dentures, are extensions of the base located in the infrabulge (retentive) area of the tooth. They are elastic and made of colorless or tooth-colored material, featuring both a retentive (infrabulge) clasp and an opposing (reciprocal) clasp. These clasps are transparent, elastic, and aesthetic, as they are made from a material that matches the color of the gums or remaining teeth. The shape, thickness, and configuration of the clasp arms may vary depending on the specific clinical situation.

The following types of flexible clasps can be distinguished:

The muco-alveolar clasp is an extension of the base located on the vestibular ridge within an infrabulge (retentive) area. Unlike traditional

clasps, it does not make direct contact with the tooth surface. This clasp is elastic and designed to match the color of the mucosa (Figure 2).

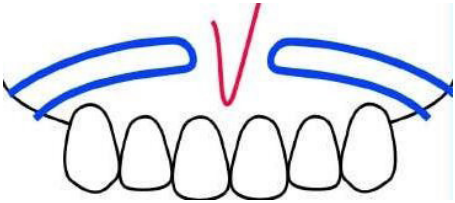


Fig. 2. Muco-alveolar clasp [20]

The dental-periodontal clasp is an extension of the base that is placed on the tooth. It is elastic and made of colorless or tooth-colored material (Figure 3).

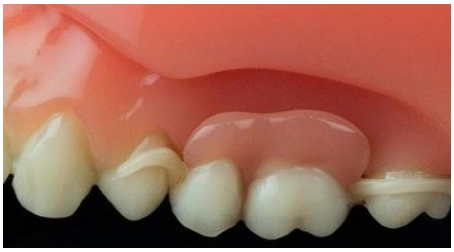


Fig. 3. Dental-periodontal clasp [21]

The reduced palatal plate offers some advantages, including reduced patient's discomfort, improved sense of taste and thermal perception, and decreased vomiting reflex.

The distally cut plate is oval-shaped, cut 2-3 cm distally in the sagittal direction. This increases the space for the patient's comfort (Figure 4).

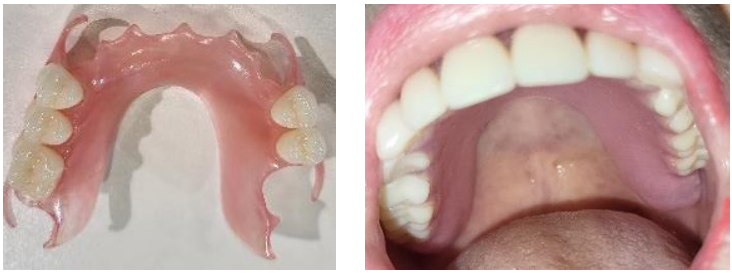


Fig. 4. Distally cut plate (upper jaw)

The fenestrated (window-shaped) plate is cut centrally in a round shape, improving the sense of taste (Figure 5).

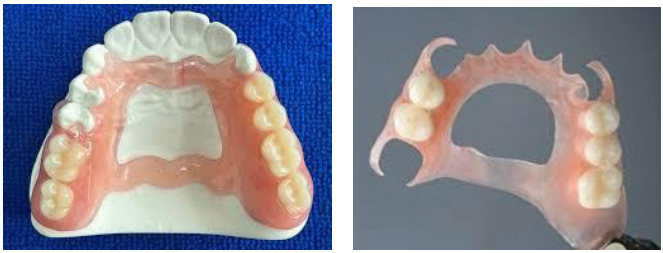


Fig. 5. Fenestrated plate (upper jaw)

The neck-supported plate protects the marginal periodontium of the remaining teeth (Figure 6).

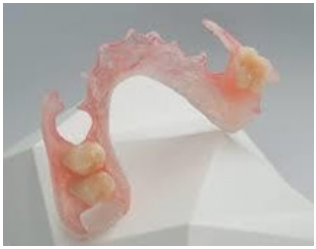


Fig. 6. Neck-supported plate (lower jaw)

The lingual plate completely covers the lingual ridge of the alveolar crest and the alveolar process in the area of the remaining teeth. It should maintain a distance of 1-2 mm from the infrabulge (retentive) area of the remaining teeth and the area of the marginal periodontium (Figure 7).

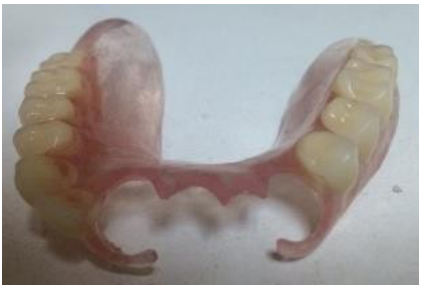


Fig. 7. Lingual plate

INDICATIONS FOR THERAPY OF PARTIAL EDENTULISM WITH FLEXIBLE REMOVABLE PARTIAL DENTURE

Unlike other dental prostheses, FRPD can address a much broader range of clinical situations (reduced, terminal, extended, or extended partial edentations), such as:

- multiple edentulous spaces located on the same arch;
- Kennedy class I and II edentations, where FPD with distal extensions can be **used**, especially if the antagonistic arch is fully or hybridly prosthetic;
- when several teeth in the support area are missing, such as molars and possibly premolars, located unilaterally or bilaterally, and when the posterior prosthetic space is less than 4-6 mm;
- elderly patients who have bony protuberances or irregular tuberosities, which, under good general condition, should be surgically reduced to allow for the insertion of a removable partial denture;
- hard tissue loss caused by tumors, trauma, acute and chronic infections of the jaws, or cleft lip and cleft palate;
- at the children with partial anodontia;
- cosmetic linings to mask gingival recession;
- the treatment of choice for patients with large torus or cleft palate;
- challenging treatment involving periodontally compromised teeth;
- patients with difficulty maintaining optimal oral hygiene;
- patients with allergies to acrylic monomers found in traditional acrylics;
- clinical cases where the dental support parameters do not provide the necessary conditions for the correct placement of cast clasps;
- clinical cases such as tori or bulky tuberosities;
- aesthetic considerations to mask gingival recession;
- to avoid stress on the remaining teeth and supporting structures;
- patients treated for various severe general conditions.

CLASSIFICATION OF IMPRESSION MATERIALS. IMPRESSIONS. CRITERIA FOR IMPRESSION CLASSIFICATION

Currently, the industry is developing a rich array of impression materials with various chemical properties. The quality of impressions depends not only on the correct choice of the impression tray but also to a large extent on the impression material used. Each impression material has its own unique properties, allowing for its application in various clinical situations. Impression materials are classified based on their physico-chemical properties and the process of setting within the oral cavity.

According to Oksmann, impression materials are classified into four classes:

1) crystallizable materials (gypsum, Dentol, Repin etc.);
2) thermoplastic materials (Stens, Dentafol, Ortocor etc.);
3) elastic materials (Stomalgin 02, Sielast 03, 05, Optozil, Xantopren etc.);
4) autopolymerizing acrylics.

According to M. Gherner and M. Napadov, there are three classes of impression materials:

1) elastic
2) thermoplastic
3) tough.

According to I.I Postolachi and Gh. Bîrsa, impression materials are classified depending on the final state of the models after the impression has set:

1) elastic materials include reversible hydrocolloids (Gelin, Dentacol, etc.) and irreversible hydrocolloids (Stomalgin-73, Novalgin, ChromIQ, etc.) (Figure 8), as well as synthetic elastomers (polysulfide, polyether, silicone materials (*Huge PERFIT*) (Figure 9);

2) rigid materials comprise reversible (Stens – 02, Acrodent – 02 etc.) and irreversible materials (Dentol – C, Alstron, Plastodent etc.).

For a long time, rigid impression materials have represented a structural diversification, but they are associated with a series of shortcomings, notably irreversible hydrocolloids (alginates), which have limited applicability in fixed prosthodontics. The emergence of elastomers as impression materials is attributed to remarkable advances

Fig. 8. Elastic impression material – ChromIQ

in the chemistry of synthetic polymers. Chemically, these materials differ from hydrocolloids. The term 'elastomers,' coined in the 1950s, combines 'elastic' and 'polymer.' Chronologically, they appeared as follows: polysulfide elastomers (1954), siloxanes (1955), polyethers (1965), and vinyl polysiloxanes (1975).

The development, over almost half a century, of synthetic elastomers has revolutionized dental practice and has led to changes in some concepts and technologies in the impression-taking procedure of prosthetic fields.

The base polymers within elastomers are polysulfide, silicone, or polyether rubbers.

Synthetic elastomers, depending on their viscosity, can be classified into four types:

- ***Type I:*** Putty kits
- ***Type II:*** Heavy Body (high viscosity)
- ***Type III:*** Regular (moderate viscosity)
- ***Type IV:*** Light Body (low viscosity) (Figure 9).

Fig. 9. Silicone impression material (Huge PERFIT)

The impression serves as the negative and accurate replica of the prosthetic field.

Depending on the nature of the issue, the denture features, and the curative-prophylactic tasks, the prosthetic field differs in cases of dental crown lesions and edentulous conditions.

The criteria for classifying impression materials are as follows:

- From the standpoint of their intended purpose, the impression materials are classified as documentary, auxiliary, and base impressions.
- Depending on the material used, impression materials are classified as anatomical or functional impressions.

Currently, impression-taking techniques are tailored to each individual clinical case. In prosthodontics, the procedures for taking impressions of the prosthetic field can be classified according to several criteria, as follows:

a) depending on working time:

- single-step (monophase or global) – it is done using a single impression material;
- two-step (biphasic) – it is done using two impression materials of different consistencies;

b) depending on the number of components used:

- single-component impression;
- two-component impression (of the same material).

IMPRESSION TRAYS. CHARACTERISTICS AND TYPES OF ANATOMICAL IMPRESSIONS FOR FLEXIBLE REMOVABLE PARTIAL DENTURE

Impression trays are special devices that serve as rigid and resistant supports onto which the impression material is loaded and pressed onto the prosthetic field. They come in various sizes and shapes, specific to the maxilla and mandible. The maxillary impression trays consist of a base covering the vestibular ridge of the alveolar process, the dental arch, and the palatal vault.

Criteria for impression tray classification:

According to the material, impression trays are made from:

- plastic materials (Figure 10)
- metallic materials (Figure 11).

According to the jaw type, impression trays are made for:

- the maxilla
- the mandible.

Fig. 10. Plastic impression trays

Fig. 11. Metal impression trays

The one-step impression technique (monophase or global) includes the following steps: choosing the impression tray, selecting the impression material (*irreversible hydrocolloids – alginate*), preparing the alginate (stirring the powder, adding water at a temperature of 20-22°C, spatulating for up to 1 minute), loading the material onto the impression tray, then placing the impression tray with the impression material onto the arch, waiting for the setting time (2 minutes), removing the impression, rinsing it under running water, analyzing the impression, and finally disinfecting it with special antiseptic solutions (Figure 12).

Fig. 12. One-step impression-taking technique (monophase or global)

The two-step impression technique (biphasic) involves the process of obtaining two impressions with two different consistencies (putty and fluid silicone). Within the biphasic impressions, there are:

➢ Putty-wash impression (correction impression technique):

The correction impression (putty-wash impression) is a two-step technique that uses materials with different consistencies (silicone or polyether rubbers), the putty (high viscosity) and the light body (low viscosity). Both materials must belong to the same group. The impression should start with a putty material (silicone) and one with increased flexibility (Heavy body – polyethers). After taking and removing the impression, the fluid material is applied to the putty material, and the impression is reinserted onto the prosthetic field. Thus, the fluid elastomer serves the purpose of correcting the impressions (Figure 13).

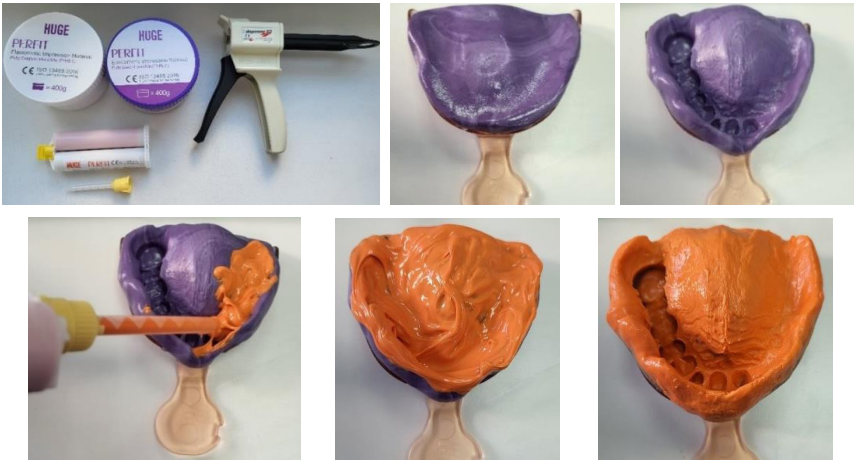


Fig. 13. Two-step impression-taking technique (biphasic)

MODEL MAKING TECHNIQUE. MATERIALS AND REQUIREMENTS FOR MANUFACTURING OF FRPD

The working model is a positive, highly accurate copy or reproduction of all elements of the prosthetic field (marginal support and extension). It is made using hard, resistant plasters such as Moldano type, etc.

Stages of model fabrication:

- After disinfecting the impression, it should be rinsed under a stream of cold water to remove saliva and blood traces.
- Preparation of Moldano plaster: the ratio of plaster to water should be strictly followed to avoid reducing the mechanical strength of the model.

- The impression is placed on the vibrating table, where the liquid plaster paste is poured at the impression center during vibration.
- Hard plaster is then poured into the impression, ensuring it covers the impression edges to replicate the configuration of the buccal fold (where there is an edentulous area). Moldano plaster sets within 30 to 40 minutes.
- After the plaster has definitively set, the impression is removed, and the base of the model is shaped (Figure 14).

The requirements for the FRPD model are as follows:

- The working model must be intact.
- It should not have any excess material, pores, cracks, gaps, deficiencies, fractures, especially in the area where the denture patterns are modeled.
- The base of the model must be 2.0 cm high.
- It should accurately reproduce the relief of the partially edentulous prosthetic field.

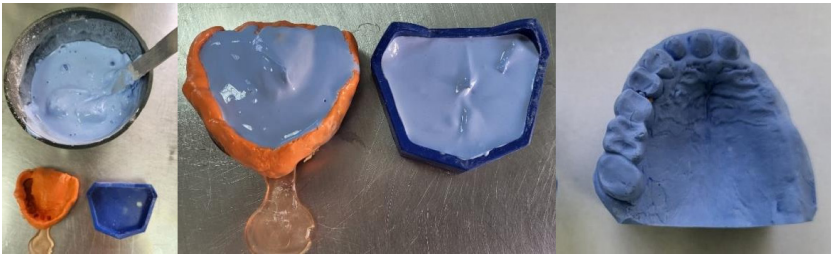
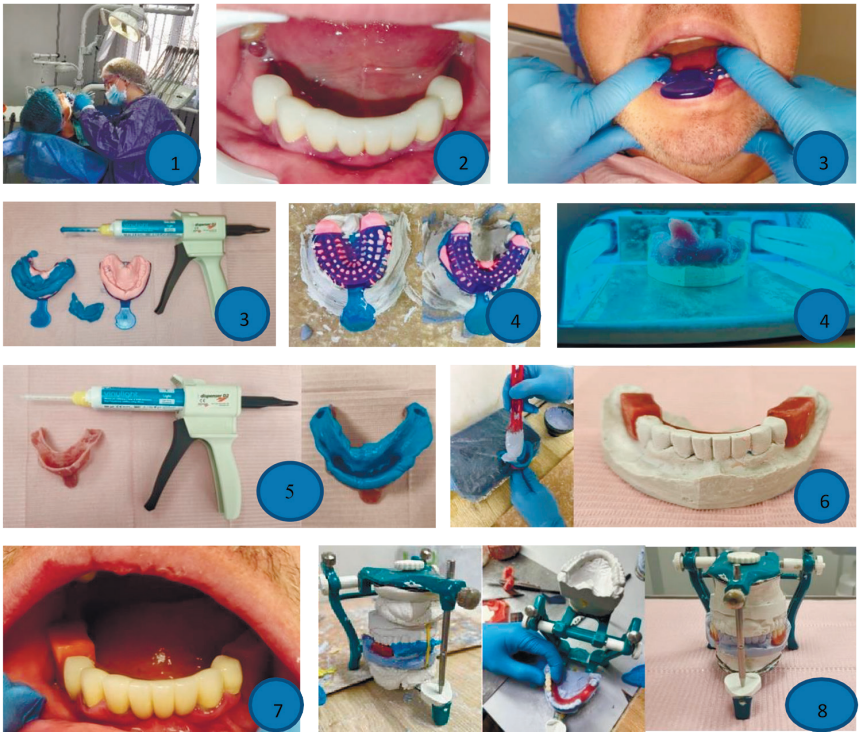


Fig. 14. Stages of model fabrication

CLINICAL AND LABORATORY STAGES OF MANUFACTURING FLEXIBLE REMOVABLE PARTIAL DENTURE

1. Examination of the patient, establishing the diagnosis, and development of the treatment plan (clinical stage);
2. Clinical status in the oral cavity of the patient (clinical stage);
3. Preliminary impression of the prosthetic field (clinical stage);
4. Casting the preliminary models and making individual trays (laboratory stage);
5. Final or functional impression-taking phase (clinical stage);
6. Making the final models and the occlusal rims (laboratory stage);



7. CRRs determination and placement in the simulator (clinical stage);
8. Making the wax model of the FRPD and placing artificial teeth (laboratory stage);
9. Trying in the FRPD in the oral cavity and giving final instructions for preparing wax patterns and models to create molds (clinical stage);
10. Preparing wax patterns and models to create molds (laboratory stage);
11. FRPD manufacturing – preparation and injection of elastic acrylic into the mold resulting from its packaging and polymerization; unpacking and processing of finished FRPD (laboratory stage);
12. Trying-in FRPD and fitting FRPD in the oral cavity (clinical stage);
13. Marginal and occlusal check of the FRPD and improving the FRPD (Figure 15).

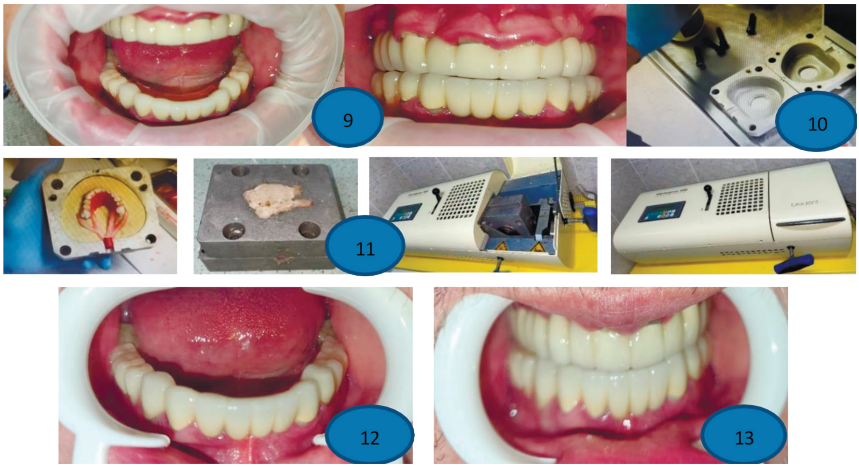


Fig.15 Clinical and laboratory stages of fabricating flexible removable partial denture

ARTIFICIAL TEETH. TYPES AND COMMERCIAL PACKAGING

Artificial teeth are used to fill edentulous spaces, creating artificial segments of dental arches to restore the integrity and proper functions of the stomatognathic system. For these reasons, artificial teeth are the primary functional components of a denture.

Artificial teeth are industrially manufactured from acrylic resins (AR) or porcelain and must mimic natural teeth both in terms of appearance and chewing efficiency. Artificial teeth come in various shapes, sizes, and colors [5].

Artificial teeth are supplied in sets, typically fixed into a strip of wax on a plastic support. Each set is marked with a number indicating its type, size, shape, color, etc. Additionally, a color key is provided with the teeth sets, consisting of four groups with different shades:

Group A – brown shade; Group B – yellowish shade; Group C – blue-gray shade; Group D – pink-orange shade.

Among the popular color keys are those developed by *VITA* and *IVOCLAR* (Figure 16 and 17). In the *VITA* color key, there are different color intensities for each shade:

- Group A: 5 intensities (A1, A2, A3, A3.5, A4)

- Group B: 4 intensities (B1, B2, B3, B4)
- Group C: 4 intensities (C1, C2, C3, C4)
- Group D: 3 intensities (D2, D3, D4).

Fig. 16. Anterior and posterior artificial acrylic teeth according to the VITA color key [22]

Fig. 17. Anterior and posterior artificial acrylic teeth according /to the IVOCLAR color key [23]

Table 1. Characteristics of artificial acrylic and porcelain teeth [24]

Artificial acrylic teeth	Artificial porcelain teeth
They are sold in sets designed to match the edentulous area and the color of the remaining natural teeth.	They are sold in sets designed to match the edentulous area and the color of the remaining natural teeth.
They are made by polymerization.	They are made by firing.
They form a chemical bond with the denture base.	They require additional retentions (cavities, retention holes).
Satisfactory mechanical strength	High mechanical strength
Dental abrasion over time	Slow dental abrasion
Varied color range	Less varied color range
Chromatic instability over time	Color stability over time
Increased permeability to liquid and oral microbial flora	Impermeability to liquid and oral microbial flora
Average physico-chemical properties	Higher physico-chemical properties
Low price	High price

RULES FOR MOUNTING ARTIFICIAL ACRYLIC TEETH IN MAXILLARY AND MANDIBULAR FLEXIBLE REMOVABLE PARTIAL DENTURE

In partial edentulism when the entire frontal group is missing, especially in the jaw, the dental technician has the following landmarks for mounting the teeth by means of templates with occlusion rims:

vestibular curvature of the upper rims of occlusion;

- the median line where the mesial faces of the upper central incisors will meet;
- the canine (commissural) lines at which the cusp of the canine is mounted.

For reduced or group edentulism in the frontal region, the remaining and opposing teeth are the most objective criteria for fitting artificial teeth:

- in the lateral areas, the teeth are mounted in the middle of the alveolar process and perpendicular to it, ensuring proper contact with the opposing teeth;
- in the frontal area, the teeth are mounted to restore the tooth curvature configuration concerning occlusion, depending on the clinical situation, teeth can be mounted with or without artificial gum;
- when several natural teeth remain, the artificial teeth are mounted considering their degree of implantation, size, shape, and neck line (Figure 18 (a) and (b));
- to fill edentulous spaces, it is necessary to mount a larger or smaller number of teeth, or to use teeth from a different group to close the gap;
- porcelain teeth are only ground on the cervical (mucosal) surface;
- acrylic teeth are perforated to achieve mechanical retention, as there is no chemical bonding between the teeth and the base material (Figure 18 (c)).

MODERN ACRYLIC INJECTION TECHNOLOGIES

Involve heating the cartridge with acrylic balls in a special device until it becomes liquid. Then, under pressure, flexible acrylic is injected into the flask. This process is governed by several principles that guide the injection of modern acrylates.

CHEMOPLASTIC INJECTION UNDER HOT POLYMERIZATION IN A DRY ENVIRONMENT

Involves injecting the MICROBASE TM paste – polyurethane resin into the plaster mold, using the appliance provided by DeTrey/Dentsply company, at a pressure of 5.5 bar for 20 minutes. The paste undergoes polymerization by inserting the flask entirely into the MICROMAT microwave oven for 7 minutes for the polymerization process. After polymerization, the flask/mold /resin set is allowed to cool in the air for one hour, after which it is cooled through immersion in cold water for 30 minutes. Once the flask has reached room temperature, the denture is unpacked and processed.

Microbase technology involves a microcomposite biomaterial with an organic polyurethane-based matrix. This biomaterial undergoes thermopolymerization in a special microwave oven for 20 minutes at a pressure of 5.5 bars.

The key element of this system is undoubtedly the injectable biomaterial in a plastic state, which rapidly hardens under the influence of electromagnetic energy. Microwave polymerization is clearly superior to other types of polymerization methods, as it ensures complete and uniform hardening of the material.

The mechanism of microwaves involves increasing the internal

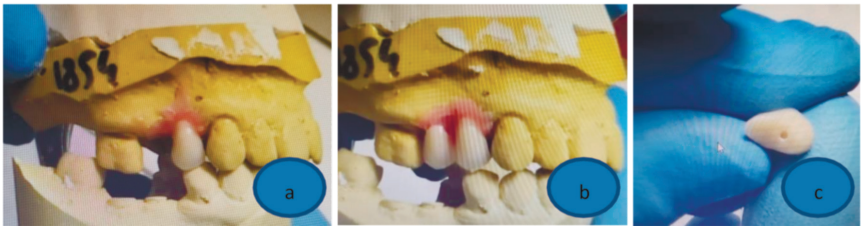


Fig. 18 Arrangement of artificial teeth in the lateral area

energy of the polymer paste, which in turn enhances molecular agitation and heats the material. Heat initiates the resin polymerization reaction, essentially leading to thermopolymerization (Figure 19).

Fig. 19. Microbase DeTrey System [25]

CHEMOPLASTIC INJECTION UNDER COLD POLYMERIZATION

The material is injected into the mold under a pressure of 4 bars, at a speed of 8-10 mm/s. The flask is maintained under pressure for 5 minutes, after which it is polymerized for 30 minutes in a water bath at a temperature of 55°C and under a pressure of 2 bars (Figure 20).

Fig. 20. Sistemul Palajet ® Pneumatic Injection Unit [26]

Types of flexible acrylics. The rapid advancement in the field of technologies for the production of macromolecular compounds has led to the use of flexible polymer compounds in dental medicine, such as BioDentaplast, Valplast®, Flexiplast, Polyan, and Dentalos. These superpolyamides are improved versions from the nylon family, developed to alter the negative characteristics of nylon, either by modifying the original formula or through copolymerization. Other noteworthy polyamides used in medical prostheses include nylonplast, protamide, superprothenyl, and supolyd. Among the alternative FRPD materials, polyamides (nylon) and copolyamides, acetal resins (polyoxymethylene), epoxy resins, polystyrene, rubber, and polycarbonate resins stand out. Most of these alternative materials require thermoplastic injection molding technology.

Valplast®, a reference product in the field of prosthodontics, is made of polyamides and was created in the 1950s by brothers Arpad and Tibor Nagy. The Prosthetics Clinic of the Faculty of Dental Medicine at Semmelweis University in Budapest conducted the initial studies to determine the clinical usefulness of this material. Valplast® is currently available in three shades of pink: light pink, pink, and meharry. The balance between advantages and disadvantages of these materials in current practice is influenced by the significant initial investment required for their use. While they offer benefits such as aiding patients allergic to acrylates, they also have drawbacks including low resistance to fracturing and difficulties related to adhesion to artificial teeth.

`Injectable acrylic (IA) is available in the form of low molecular weight granules. From a chemical standpoint, injectable acrylates are polymethylacrylates with linear polymerization, with minimal residual monomer percentage, thus enhancing biocompatibility. Notably, among these materials are the injectable products Ivocap Plus and Pala X Press (Ivoclar and Kulzer). These products are associated with specific injection systems: the S.R. Ivocap system and the Palajet system. These materials facilitate excellent adaptation of the removable denture at the level of the A-H line, which is a particularly crucial area for marginal closure. It is noteworthy that occlusal elevation, common in traditional techniques, is almost absent. Detrey-Dentsply has recently introduced a new injection system that uses a monocomponent polyurethane resin, known as microbase.

Flexible acrylic (VALPLAST) is a superpolyamide resin (SR) from the nylon family. Being thermoplastic and possessing good biocompatibility, it has been used in dentistry since 1954, demonstrating greater resistance and flexibility compared to conventional acrylates. The material is elastic, resistant to abrasion and impacts, and offers superior aesthetics. Valplast dentures are durable and provide a comfortable fit around the remaining natural teeth in the arch. Manufactured through thermoplastic injection, the material maintains dimensional stability in various environments and exhibits good elastic memory.

The Rapid Injection System, currently known as "The Flexite Company", USA, introduced the first Flexite thermoplastic product to the market in 1962, based on fluoropolymer, resulting in a plastic material similar to teflon. Currently, there are several systems on the market that promote thermoplastic materials with multiple applications in dentistry, including removable partial dentures with a flexible base, saddles for skeletal dentures, pre-fabricated clasps, crowns and temporary fixed partial dentures, occlusal splints, implant abutments, orthodontic devices, etc.

Due to its properties, it can be made very thin and flexible, with clasps matching the color of natural tissues, making it unnoticeable. It can also be used in prostheses for patients with temporomandibular joint (TMJ) disorder, to make mouthguards, among other applications. It has special mechanical resistance and can be used to make both saddles and connectors. It can also be used to offer temporary treatment solutions for partial edentations, such as Kemmeny prostheses. Among the systems, the following types can be mentioned: ***Flexite*** (The Flexite Company), ***Valplast*** (Valplast Int. Corp.), ***PolyAress/PVS-H-Polyan*** (Girrbach Dental), ***Flexiplast*** (Bredent), ***Success FRS*** (Dentsply), ***Proflex System*** (DR Dental Resourse Inc.), and ***The.R.Mo. Free*** (If Dental). ***Polyamide*** and ***copolyamide*** thermoplastic materials are ideal for flexible removable prosthetic restorations (FRPD) due to the following properties:

- They maintain an excellent balance between mechanical strength, ductility, heat resistance, and inherent flexibility.
- They exhibit increased resistance to fatigue and feature a special elastic memory.
- Their structure can be easily modified to enhance rigidity and wear resistance.

- They demonstrate increased elasticity.
- They do not contain residual monomers.
- They are fracture-resistant.
- They have a low specific gravity.
- They are impermeable to fluids from the oral environment.

However, it should be noted that these materials lack sufficient abrasion resistance and may not maintain the vertical dimension of occlusion (VDO) under direct occlusal stresses.

Valplast (Valplast Int. Corp.), which is available in natural pink shades, can be shaped very thinly. This allows not only for the base and saddles of the denture to be made, but also enables the creation of clasps that encircle the supporting teeth, similar to the gingival festoon, providing an enhanced physiognomic appearance. These clasps essentially rest on the marginal periodontium of the supporting teeth. Partial dentures made from this material exhibit increased stability and retention over time, primarily due to the elasticity and flexibility of the material (Figure 21).

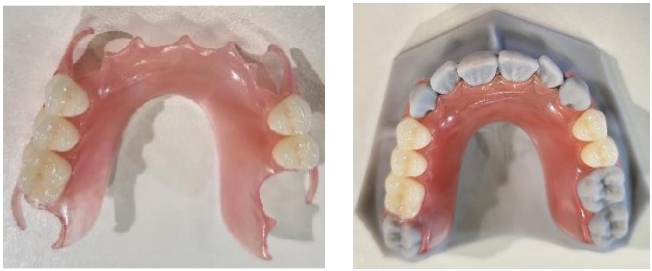


Fig. 21. Valplast maxillary denture

BioDentaplast is a highly crystalline thermoplastic resin primarily composed of a polyoxymethylene base, which belongs to the group of acetyl resins. It is commonly used for making removable partial dentures, offering enhanced absorption and cushioning of masticatory pressures. A partial denture with an elastic base is a removable prosthesis where the rigid dental- periodontal and mucosal supports are cushioned by the elastic base.

Thermoplastic-elastic materials are biologically inert, biocompatible, non-irritating, and non-allergenic. They are thinner, more accurate, and feature pink clasps on the mucosal surface and white clasps on the tooth

surface. Additionally, they do not fracture and exhibit a memory effect, returning to their initial shape. These materials are essentially nylon-based acrylic resins. The resin is sold in cartridges and supplied in granule form. It liquefies at temperatures higher than 200°C. One advantage of the resin is that it eliminates errors caused by incorrect proportions of components or the influence of other external substances that could adversely affect the structure of the IRPD. The Bredent company (Germany) recommends preheating these pre-dosed cartridges at 220°C for 15 minutes, while the flask should be heated to a temperature ranging from 50°C to 120°C. Once the cartridge is heated, a constant pressure of 7.2-7.5 bar should be applied. The density of the resin is 1.41 g/cm³. It becomes liquid for a short time at 150°C, then solidifies into a crystalline thermoplastic resin. Unlike classic acrylate, it is not affected by a pH lower than 4. Once hardened, it becomes microretentive.

The BioDentaplast resin is available in four dental shades, coded as follows: A1, A2, A3, B2, and B3. It is highly resistant from a biomechanical standpoint and meets the most rigorous physiognomic demands. Removable dentures made with *BioDentaplast* resin represent the most modern form of dental prostheses. The clasps are elastic and aesthetic, matching the color of the remaining teeth (Figure 22).

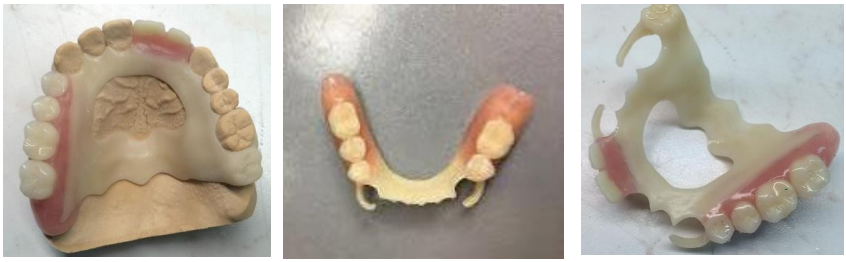


Fig. 22. BioDentaplast RPD (upper and lower jaws)

Advantages of BioDentaplast dentures:

- clasps with excellent elasticity, allowing for denture insertion and removal without affecting the supporting teeth;
- long-term material resistance, preventing impregnation with food debris and maintaining its chemical composition.

Physical and chemical properties of BioDentaplast dentures:

- semi-crystalline with a linear structure and increased crystallinity;
- increased hardness and considerable rigidity, providing resistance to breaking;
- good dimensional stability with limited toxic or allergenic potential;
- resistant to boiling and sterilization, as well as to weak acids, alcohol, and washing baths;
- not resistant to acids with a pH < 4.

Denture materials have to meet some requirements. They should:

- fulfill the patient`s aesthetic preferences without necessitating excessive removal of healthy dental tissue;
- facilitate an optimal response of the tissues in the oral cavity;
- allow for a timely analysis of materials and tissues that form adjacent contacts, as well as technical considerations.

UNPACKING FLEXIBLE REMOVABLE PARTIAL DENTURE

This step involves removing the polymerized denture from the mold walls and washing it under running water (Figure 23).

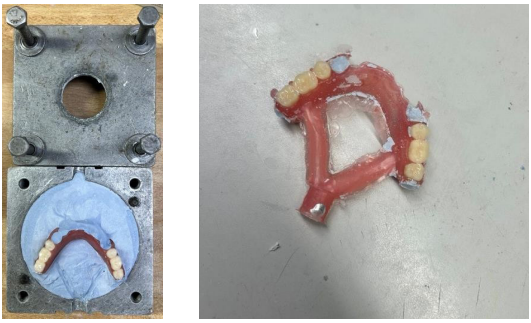


Fig. 23. The steps of unpacking FRPD

PROCESSING AND POLISHING OF FLEXIBLE REMOVABLE PARTIAL DENTURE

This method involves the following steps:

1. ***Smoothing*** consists of removing excess acrylic using acrylic cutters.

2. ***Polishing*** includes using filaments, brushes, fluffs, and polishing pastes (such as quartz and feldspar powder).

Finished flexible removable partial denture should meet the following requirements: On the outer and inner surfaces, they must:

- facilitate the sliding of periprosthetic soft tissues during the functions of the dento-maxillary apparatus.
- prevent injuries in contact areas (tongue, floor of the mouth, mucous membranes of the lips and cheeks), prevent adhesion and stagnation of food on the denture surface.
- maintain their original color for a longer period (Figure 24).

Fig. 24. Valplast RPD in the lower jaw (external and internal view)

Work technique: Pumice, quartz, or feldspar powder is mixed with water to obtain a paste of creamy consistency. The outer surfaces of the denture are first polished using a conical thread adapted to the threaded cone of the grinder, while continuously applying the abrasive paste. The final gloss is achieved with the help of cotton fluff, after rigorously washing the denture with the abrasive paste. The denture will achieve a glossy finish when a paste made of gypsum and alcohol is applied with cotton fluff. The polished denture should display an intense gloss, a contour that blends well with the prosthetic field, and a natural appearance (Figure 25).

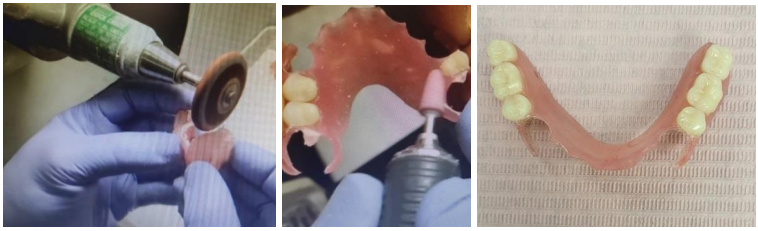


Fig. 25. Processing and polishing of the flexible removable partial denture

ACQUIRED SKILLS

1. Understanding the components of the partially edentulous prosthetic field;
2. Recognizing the clinical forms of extended partial edentulism and recommending therapy with removable denture;
3. Familiarity with the materials and technologies used in making flexible removable denture;
4. Proficiency in the impression-taking stages for manufacturing flexible denture;
5. Mastery of the clinical and technical stages involved in making flexible removable partial denture;
6. Knowledge of the various types of modern acrylics used in FRPD manufacturing;
7. Ability to develop an individualized approach for each clinical case, including the formulation of a prosthetic treatment plan.

At the end of the course, the student will be able to:

1. Identify the clinical forms of extended partial edentulism requiring treatment with flexible removable partial denture.
2. Master the components of injected removable partial denture.
3. Gain sufficient knowledge about the materials and methods used in making flexible removable partial denture.
4. Assess the denture base limits and the anchoring components of FRPD.
5. Be familiar with the specific clinical and technical stages involved in making flexible removable partial denture.
6. Recognize the peculiarities of impression-taking techniques in therapy with flexible partial removable denture.
7. Apply the wax modeling techniques for FRPD creation.
8. Understand the process of making occlusion border templates and bite rims.
9. Use the methods for establishing centric intermaxillary relations and the process of plaster pouring in simulators.
10. Understand the criteria for evaluating the try-in of the FRPD wax pattern.
11. Apply the steps involved in packing the model, the injection phases, and the sequence for unpacking, processing, and polishing FRPD.

ASSESSMENT SHEET FOR SECOND YEAR STUDENTS, THE 4TH SEMESTER SUBJECT: THE TECHNOLOGY OF MAKING REMOVABLE PARTIAL DENTURE

Prior faculty approval in order to demonstrate the skills		
Pavel Godoroja Department of Dental Propaedeutics	Group	Date
For the examiner during the work		
To acquire the skills, the student must pass each procedure with a passing grade. **The passing grades are indicated in bold.**		
Examiner	Examiner's signature	_____year
	Starting date:	Completion date:

Student	Name:	ID#:

Practical skills	**Classification**				**Parameters**
Infection control	0	5	**7**	**10**	Checking at the beginning and throughout each stage
Impression-taking of the prosthetic field Making plaster models	0	7	**14**	**20**	Stages of anatomical impression-taking Distribution of the impression material and the elements of the prosthetic field Stages of model fabrication
Making occlusion templates Model plastering	0	15	**23**	**30**	Outlining the boundaries of the removable partial denture Dimensions of the occlusal rim in the frontal and lateral areas Plastering the models in simulators
Mounting artificial teeth on the upper and lower arches Modeling the wax pattern of the denture	0	15	**25**	**30**	Morphology Shape Color

Professionalism	0	5	**8**	**10**	Ethics Time management Self-assess-ment

Total (Maximum 100 points)				
Examiner		Date		
Assessment revised together with the student Student's signature **(**for skills only)	_____ _____	 Date	_____ _____	

Suggestions / Improvement **plan** _____

Materials and devices used: model conformer for creating models, maxillary/mandibular impression tray, plaster, mixing bowl, wax for modeling the base plate of the removable partial denture, artificial teeth, electric spatula (wooden handle spatula) for modeling.

SELF-ASSESSMENT TESTS

1. SC. List the indications for the use of flexible removable partial denture:
   A. Schröder atrophy of the alveolar process of the maxilla, class I
   B. Schröder atrophy of the alveolar process of the mandible, class I
   C. Vertical tooth migration
   D. Tooth migration
   E. Dental lesions

2. SC. Call the components of flexible removable partial denture:
   A. The metal framework
   B. Acrylic flexible RPD base
   C. Wire clasp
   D. Metal saddles
   E. Cast clasp

3. SC. Identify the impression materials should be used in order to make flexible removable partial denture:
   A. Reversible hydrocolloids
   B. Irreversible hydrocolloids
   C. Alginate materials
   D. Synthetic elastomers
   E. Metallic materials

4. SC. In which clinical situations is used the Kemenny denture:
   A. Extensive edentulism
   B. Extended partial edentulism
   C. Reduced partial edentulism
   D. Subtotal edentulism
   E. Complete edentulism

5. SC. Identify the thickness of flexible removable partial denture:
   A. 0,3
   B. 0,7
   C. 0,9
   D. 1,2-1,5
   E. 1,5

6. SC. Identify the commercial variety of flexible acrylics:
   A. Pasta
   B. Monomer and polymer
   C. Granules
   D. Polymer
   E. Powder

7. SC. List how many additional holes are typically made during the process of packing the flexible removable partial denture wax pattern:
   A. One posterior hole
   B. One back and two lateral holes
   C. Two lateral holes
   D. One posterior and one anterior hole
   E. Both posterior holes

8. SC. Call the component elements of partially edentulous prosthetic field:
   A. Remaining teeth, edentulous alveolar processes
   B. Missing teeth
   C. Only the palatal torus
   D. Upper lip frenulum
   E. Lower lip frenulum

9. SC. List the types of materials used to make elastic removable partial denture:
   A. Flexite MP
   B. Flexite Plastic
   C. Flexite Plus
   D. Flexite Pro-Guard
   E. Flexite Super Plus

10. SC. Call the he contraindications to flexible removable partial denture:
   A. Good health
   B. Local lesions
   C. General diseases
   D. Allergies to simple acrylics
   E. Patients aged over 18 years

11. MC. Identify the components of flexible removable partial denture:
    A. Flexible acrylic removable partial denture base
    B. Elastic clasps
    C. Denture saddles
    D. Artificial teeth
    E. Metallic clasps

12. MC. List the clinical steps in making flexible removable partial denture:
    A. Making the impression and the preliminary model
    B. Making the preliminary impression
    C. Making the individual impression tray
    D. Establishing the centric relation
    E. Placing models in simulators

13. MC. Call the indications for the use of flexible removable partial denture:
    A. Allergy to acrylic monomer
    B. Liners to mask gum recession
    C. The treatment of choice for patients with large torus or cleft palate
    D. In postextraction wounds
    E. Significant resorption of the alveolar process

14. MC. Call the advantages of flexible removable partial dentures:
    A. Patient`s comfort
    B. Improved physiognomic restoration
    C. Close adaptation
    D. Light weight
    E. Low cost

15. MC. List the technical stages of making flexible removable partial denture:
    A. Making the functional impression
    B. Making the preliminary impression and the preliminary model
    C. Model creation
    D. Fabrication of the template with the occlusal rim
    E. Trying-in the mock-up in the oral cavity

16. MC. Characterize the process of unpacking flexible removable partial denture:
    A. Unpacking the mold
    B. Removing the denture from the mold
    C. Mechanical processing of the flexible removable partial denture
    D. Flexible removable partial denture sandblasting
    E. Flexible removable partial denture polishing

17. MC. Identify the modern acrylic injection technologies:
    A. Chemoplastic injection under hot polymerization in a dry environment
    B. Chemoplastic injection under cold polymerization
    C. Chemoplastic injection under hot polymerization in a moist environment
    D. Chemoplastic injection under cold polymerization in a moist environment
    E. Chemoplastic injection without pressure

18. MC. Call the advantages of Valplast used in the manufacture of flexible removable partial denture:
    A. Flexible RPDs can be rebased (relined)
    B. Mechanical strength
    C. Colour similar to dental tissues
    D. Minimum thickness of the denture base
    E. Low cost

19. MC. List the advantages of modern acrylic injection in the manufacture of flexible removable partial denture:
    A. Provides an exact replica of the wax pattern
    B. Ensures dimensional stability
    C. Allows for faster completion
    D. Reduces the stages of completion
    E. The injection process is simple

20. MC. Identify the classification of artificial teeth used in the manufacture of flexible removable partial denture:
    A. Acrylic teeth
    B. Ceramic teeth
    C. Metal teeth
    D. Metal-ceramic teeth
    E. Metal-acrylic teeth

KEYS

1. A
2. B
3. D
4. C
5. A
6. C
7. A
8. A
9. A
10. B
11. A,B,C,D
12. B,D
13. A,B,C
14. A,B,C,D
15. C,D
16. A,B,C,E
17. A,B
18. B,C,D
19. A,B,C,D
20. A,B

REFERENCES

1. Bartieri A., Giliseppangclo F. Industrial Fabrication Promoter of Porcelain Prosthetics. In: *Rassegna Trimestriale di Odontiatria ,* 1958, 2:134-179.
2. Bechir Ana Maria, Ghergic Doina Lucia, Bechir E.S. Studiul comparativ al adaptării pacienților la restaurările mobilizabile flexibile. În: *Revista Română de Stomatologie* – Vol. Liv, Nr. 1, an. 2008, pag. 41-45.
3. Borțun, Cristina, Letter, M., Sandu, Liliana. Tehnologia protezelor parțiale mobilizabile, Editura Eurobit, Timișoara, 2002.
4. Bratu D, Ierimia L, Uram-Țuculescu S. Bazele clinice și tehnice ale protezării edentației totale. Ed. Medicală. Timișoara, 2005.
5. Bratu D., Bratu E., Antonie S. Restaurarea edentațiilor parțiale prin proteze mobilizabile. În: Restaurarea edentațiilor parțiale prin proteze mobilizabile, Editura Medicală, București, 2008.
6. Burlui V. Silvaș S.M. Clinica și terapia edentației totale vol.II Ed. Apollonia. Iași, 2003.
7. Craig GR., Powers MJ. Restorative Dental materials. Ediția a XI-a. Editura Mosby. Inc. 2002. *Editura Medicală Bucureşti*, 2008, pag. 105-126.
8. Fala Valeriu. Tratamentul complex la pacienții cu parodontită cronică și edentații. *Teza de doctor habilitat în științe medicale.* Chișinău, 2015, 200 p. CZU: 616.314.17-008.1-089.
9. Forna NG, Mocanu C, Scutariu M. Antohe M. Tratat de protetică – Actualități în clinica terapiei partial întinse. Ed. Demiurg. Iași, 2009.
10. Keenan PL, Radford DR, Clark RK. Dimensional change in complete dentures fabricated by injection molding and microwave processing. In: *J Prosthet Dent.* 2003 Jan;89(1):374.
11. Kutsch VK, Whitehouse J, Schermerhorn K, Bowers R. The evolution and advancement of dental thermoplastic. In: *Dental Town Magazine.* 2003.
12. Leszek A. Dobrzanski and Lech B. Dobrzanski. Dentistry 4.0 Concept in the Design and Manufacturing of Prosthetic Dental Restorations. In: *Processes* 2020, 8(5), 525; https://doi.org/10.3390/pr8050525.
13. Materialele cursurilor teoretice.
14. Mcgarry TJ, Nimmo A, Skiba JF, et al. Classification system in partial edentulism. In: *J Prosthodont* 2002; 11(3):181-93.

15. Nikhila Ky C., Rajeswari L., Shetty R. Restoring the harmony of function and aesthetics in partially edentulous arches: A case report. In: *IP Annals of Prosthodontics and Restorative.* 2020. *Dentistry* DOI: 10.18231/j.aprd.2019.029.
16. Nishigawa G, Matsunaga T, Maruo Y, Okamoto M, Natsuaki N, Minagi S. Finite Element Analysis of the Effect of the Bucco-Lingual Position of Artificial Posterior Teeth under Occlusal Force on the Denture Supporting Bone of the Edentulous Patients. In: *J Oral Rehab.* 2003;30:646–52.
17. Parvizi A, Lindquist T, Schneider R. Comparison of the Dimensional Accuracy of Injection- Molded Denture Base Materials to that of Conventional Pressure-Pack Acrylic Resin. In: *Journal of Prosthodontics.* June2004;13(2):8389.
18. Petre A. Protetica Dentară Fixă și Ocluzologie. 2009, pag. 1-9.
19. Postolachi I. Protetică dentară. În: Chișinău *„Știința”*, 1993, pag. 337-342. *Rassegna Trimestriale di Odontiatria*, 1958, 2:134-179.
20. Singh J. P., Dhiman R. K., R. Bedi P. S., Girish S. H. Flexible denture base material: A viable alternative to conventional acrylic denture base material. In: *Contemp Clin Dent.* 2011 Oct- Dec; 2(4): 313–317. doi: 10.4103/0976-237X.91795 PMCID: PMC3276859 PMID: 22346159.
21. Thompson R., Cohasset M. Dentistry in the modern era. In: *J Am Dent Assoc*. 2015, 146(8):567-568. Disponibil: doi: 10.1016/j. adaj.2015.06.014.
22. Thompson R., Cohasset M. Dentistry in the modern era. In: *J Am Dent Assoc.* 2015, 146(8):567-568. Disponibil: doi: 10.1016/j. adaj.2015.06.014.
23. Yunus N., Rashid A., Azmi L., Abu-Hassan M. Some flexural properties of a nylon denture base polymer. In: *Journal of Oral Rehabilitation*, 32, 2005, pp. 65-71.
24. Zarb G.A., Bolender C.L., Carlsson G.E. 11th ed. St Louis: Mosby; 1997. In: *Boucher's Prosthodontic Treatment for Edentulous Patients*; pp. 337–42.
25. https://navistom.com/ru/heraeus-kulzer-palajet-89220.html - accesat la 09.05.2024.
26. https://ru.scribd.com/presentation/460485774/DIN%C5%A2I-ARTIFICIALI-12335 - accesat la 10.05.2024.

27. https://www.doriotdent.ro/garnituri-ivostar-gnathostar-a35-ivoclar/- accesat la 17.05.2024.
28. https://www.google.com/search-sistemul-Microbase-DeTrey-in-dentistry - accesat la 23.05.2024.
29. https://www.pearsonlab.com/catalog/product asp?majcatid=191&catid=1104&subcatid=1391 5&pid=5584427 - accesat la 04.06.2024.
30. https://pindandentallab.com/products/flexible-dentures/ - accesat la 06.06.2024.
31. https://www.poka.ro/mft-vita-garnituri-dinti-de-diferite-culori-si-marimi-1-sina-set - accesat la 14.06.2024
32. scribd.vpdfs.com_croșete-dentare.pdf - accesat la 16.06.2024.
33. scribd.vpdfs.com_croșete-dentare.pdf - accesat la 18.06.2024.

Tipărit la **"Tipografia Nr.1" SRL**
MD-2001, Chișinău, str. 31 August 1989, 46
Tel: (+373) 069 104 435