

Prosthetic Dental Medicine

Contemporary requirements to fixed interim prosthetic constructions

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Съвременни изисквания към неснемаемите временни протетични конструкции

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Abstract

Fixed prosthetics is the preferred method for the treatment of partial edentulousness and/or defects of the dental crown (s). Provisional prosthetics is a key stage in successful prosthetic treatment. The more complicated the clinical case, the more likely it is to require an extended period of provisionalisation, and sometimes the use of more than one temporary structure. The tasks performed by the interim constructions can be grouped according to the main medico-biological indicators – functional, prophylactic and aesthetic. Along with the increase in the economic well-being of the society, the number of patients willing to request and finance more complex and long-term multidisciplinary treatment increases, which increases the period of use and the requirements for fixed temporary prosthetic structures. The purpose of this review is to reflect the increased requirements for the provisional (“temporary”) phase of fixed prosthetic treatment.

Key words: provisional prosthetics, fixed temporary, medico-biological indicators.

Резюме

Неснемаемото протезиране е предпочитан метод за лечение на частично обеззъбяване и/или дефекти на зъбната корона/и. Предварителното протезиране е ключов етап от успешното протетично лечение. Колкото по сложен е клиничният случай, толкова по-вероятно е да се налага увеличена продължителност на периода на предварително протезиране, а понякога и ползване на повече от една временни конструкции. Задачите, изпълнявани от временните конструкции могат да бъдат групирани според основните медико-биологични показатели – функционални, профилактични и естетически. Успоредно с увеличаване икономическото благосъстояние на обществото се увеличава броя на пациентите склонни да изискват и финансират по-сложно и продължително мултидисциплинарно лечение, което увеличава срока на ползване и изискванията към неподвижните временни протетични конструкции. Целта е този обзор е да отрази повишените изисквания към предварителната („временна“) фаза на неподвижното протетично лечение.

Ключови думи: предварително протезиране, неснемаеми временни, медико-биологични показатели

Fixed prosthetic constructions, with tooth or implant support are the preferred method for replacing missing teeth, dental structures, function and esthetics. For a long time in Bulgaria interim constructions were avoided or considered a tem-

porary replacement of the final construction for the period of its processing [1, 3]. In the beginning of the 21st century the preliminary stage of the prosthetic treatment was recognized as a crucial part of fixed prosthetic dental treatment [1, 2]. The

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requirements for temporary structures (according to Federick [10] and Krug [4]) are:

- To protect the pulp and desensitize the prepared teeth
 - To protect the prepared teeth from caries
 - To provide function and comfort
 - Through them to assess the parallelism of the abutment teeth
 - Allow direct replacement of missing teeth
 - To fix the position of the abutment teeth
 - To improve aesthetics
 - To provide a suitable environment for periodontal health
 - To help maintain home oral hygiene
 - To support the surgical phase of periodontal treatment by allowing visualization and access to the operative field when removed
 - They create support and restraint for periodontal medications and bandages
 - Stabilizes movable teeth during the period of periodontal treatment
 - Provides a surface for placing braces for orthodontic movement of teeth
 - Assists in the establishment and verification of occlusal relationships before final recovery
 - Allows evaluation of vertical relationships, phonetics and chewing function
 - Helps to clarify the prognosis of bridges in question when planning prosthetic treatment

These requirements can be grouped as tasks, related to the major medico-biological considerations – prophylactic, functional and esthetic.

Prophylactic tasks:

- protecting the prepared teeth from the oral environment;
 - not harming vital dental pulp with exothermic reaction during intraoral setting [3];
 - preventing migration of the prepared teeth;
 - protection of the temporomandibular joint by defining stable maxillomandibular relation [4, 5, 10];
 - maintaining the health and position of periodontal tissues [6];
 - prevention of the patient's mental state by clarifying the limitations and gaining realistic idea

for the final results, that is also a key element for the treatment [5].

Functional tasks:

- ensuring normal masticatory function and approbation of the occlusal-articulation contacts;
 - preservation of speech function and sound formation;
 - restoration of normal vertical maxillomandibular relationship by recreating the shape of the planned permanent prosthesis.

Esthetic tasks:

- improving the patient's appearance or preserving the original one depending on the patient's wishes;
 - creating a prototype of the permanent construction for more accurate visualization of the desired final appearance of the patient and the transfer of this information to the laboratory;
 - achieving optimal aesthetic results by designing, evaluating, correcting and re-evaluating the color, shape and size of the "white" and "pink" aesthetics [5].

Terms for provisional prosthetic treatment

Temporary structures must be identical to permanent ones in all aspects except the material from which they are made. The choice of the type of temporary structure and the materials for its construction must be determined by the duration of the intraoral stay according to Weintraub and Zinner [9]. Pietrobon et al. [13] indicate directly made temporary structures for short-term use – up to 1 month, direct-indirect, "egg shell" type – from 1 to 6 months and indirect, reinforced – between 6 months and 2 years.

Trends in contemporary non-removable dental prosthetics

For the first time in Bulgaria, Dimova M., in her dissertation from 2003 [1] conducted a survey among dentists from all parts of the country, regarding various clinical and laboratory aspects of temporary prosthetics with non-removable structures in practice. The results [2] show that in our

country, due to socio-economic factors, the use of indirect methods of pre-prosthesis is avoided, as it is often necessary after tooth preparation and before the laboratory-made long-term temporary structure to place a direct temporary prosthesis. Nowadays, due to the increase in life expectancy and the demographic phenomenon of population aging in developed countries, the period of active employment per person is extended [7]. In the period 2003-2021 the socio-economic situation in Bulgaria changed in a positive direction – according to IMF data [11] GDP per capita at current prices increased almost 4 times – from BGN 4,696 in 2003 to BGN 18,172 for 2021. The increased purchasing power of our population is the reason to believe that the attitude of physicians and patients to the additional cost in the stage of interim prosthetics has changed. Because this stage is crucial for the predictable and certain end result of the treatment [10], the application of even higher cost procedures is a justified cost, which necessitates a more in-depth study of the various methods and protocols used for indirect or direct-indirect long-term interim prosthesis. The increase in the standard of living leads to an increase in the number of patients wishing prosthetic treatment with non-removable prosthetic structures and their increased requirements for the temporary period. In many cases, before the definitive prosthesis, the period of pre-prosthesis has to be longer than the usual period for the production of permanent structures in the dental laboratory – 14-21 days. [6]. Complex, multi-disciplinary treatment cases often rely on fixed long-term provisional restorations.

For example:

Long-term **periodontal treatment** in patients with partial edentulousness – prosthetic restoration of missing teeth and fixing the position of those present during the recovery period after the initial and surgical phases of periodontal treatment, including fixing the position of the papillae and preventing the marginal gingival edge from injury.

Implant treatment – in the classical protocol of loading by Branemark et al. [8] after com-

plete osseointegration of the implants, temporary construction is often required within these 4-6 months; in the case of immediate protocols, splinting of implants with a temporary structure within the period of osseointegration (4-6 months) is also recommended.

Restoration of maxillomandibular relationships lost due to parafunctions, abrasion and erosion of hard dental tissues – protocols of gradual restoration of vertical relationships are recommended, which is achieved through movable or fixed pre-splinting. As removable splints do not improve function and aesthetics, fixed temporary structures may enhance patient compliance and acceptance of the treatment. The constructions must be able to withstand the pathological habits of patients with parafunctions.

Contemporary manufacturing methods

Digital technologies (CAD/CAM) for interim prosthetics have seriously entered everyday practice and seriously shortened the time for their development in a clinic and laboratory [14]. PMMA disc-turned temporary structures avoid the toxicity, heating and shrinkage of self-curing and double-curing plastics for clinical use. Other advantages are increased mechanical resistance [14, 15, 16], fitting and color resistance [14]. Using composite materials for long-term interim constructions is also an option, as they superior clinical properties [17].

Increasingly available are the 3D printing installations, in which the production after the digital design is carried out by adding material, which allows saving material and reduced production time, compared to the production by subtraction (turning) [18, 19, 20]. According to a number of studies, the printed temporary ones are not inferior in accuracy and strength to the turned ones [15, 16, 21, 22].

Conclusion

With the application of increasingly complex treatment protocols in modern dental medicine, the requirements for the qualities of temporary

prosthetic constructions are increasing. Satisfaction of the requirements set by the progress of modern trends and by the increased subjective assessment of patients to the aesthetic parameters of size, shape and size correlate with the high functional value of temporary prosthetic structures. This gives grounds for the majority of the authors, whose works are commented in this review to determine and define the high prophylactic value of non-removable prosthetics with temporary prosthetic structures – crowns and bridges.

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