ORIGINAL ARTICLE

WAYS OF IMPROVING THE QUALITY OF PROSTHETICS OF MILITARY PERSONNEL

DOI: 10.36740/WLek202305226

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ABSTRACT

The aim: Justify the choice of the construction material of dental prostheses, taking into account the clinical picture and concomitant diseases in military personnel and the study of the dynamics of military personnel seeking orthopedic dental care.

Materials and methods: 185 military personnel were examined and fitted with prosthetics in the period from March 2022 to March 2023. Methods: general clinical, content analysis, bibliosemantic, medical and statistical.

Results: All patients who came to us for dental care had previously been replaced with fixed metal structures. Of them, 121 people indicated problems related to the use of metal prostheses. From these patients, a risk group of intolerance to prosthesis materials was formed and a search was made for base materials that would be biologically indifferent. For the manufacture of partial removable prostheses, we chose the basic thermoplastic material Acron, manufactured by Roko (Poland), which has high biocompatibility with the tissues of the prosthetic bed. When choosing the structures of partial removable prostheses in patients with various defects of the dentition, we were guided by a small number of clinical visits, which is relevant for military personnel who are on rotation and treated in the hospital.

Conclusions: Our careful selection of structural material made it possible to prevent complications and produce high-quality removable prostheses in a short period of time. An analysis of the reasons for orthopedic care showed low awareness of the servicemen regarding the need for timely orthopedic treatment.

KEY WORDS: military stomatology, periodontal disease, acrylic polymers, thermoplastic materials, biocompatibility

Wiad Lek. 2023;76(5 p.2):1302-1308

INTRODUCTION

The repulsion of Russia's full-scale aggression against Ukraine is taking place against the backgr1ound of high dental morbidity among the servicemen of the Armed Forces of Ukraine. Numerous studies that were conducted before its beginning established a high level of dental morbidity among the personnel of the units that participated in the ATO/OS in the east of Ukraine (2014-2021) [1-3]. In the structure of diseases of the oral cavity of military personnel, caries and its complicated forms (pulpitis, periodontitis) prevailed (88.7%), periodontal diseases make up 3.9%, others (mucous membrane diseases of the oral cavity, non-carious lesions, etc.) - 7.4% [4]. The authors also established that a large part of military personnel who needed oral cavity rehabilitation was 57.47%, and the number of those who needed orthopedic treatment (dental prosthetics) was 9.36% of the number of those examined during preventive examinations [4, 5]. These preliminary data indicate significant problems with dental health in military personnel who are now resisting a full-scale Russian invasion of Ukraine.

Due to the specific conditions of life and combat activity of the personnel of the Armed Forces, connected with the peculiarities of the military profession, military dentistry has always occupied a special place in the dental service of Ukraine. To provide all types of dental care to military personnel in full, specialized units are organized in military medical institutions, namely offices, departments, clinics [6].

In 2015, in order to optimize the organization of providing dental care to servicemen of the Armed Forces of Ukraine, on the basis of a number of legal acts, the «Instructions on the procedure for providing dental care in health care facilities and medical units of the Armed Forces of Ukraine» was created, approved by order of the Ministry of Defense of Ukraine No. 1071/27516 of September 7, 2015 [7], which regulates the provision of dental care to military personnel. Since the beginning of the full-scale invasion, the Ministry of Health of Ukraine has also made numerous changes to legal acts related to assistance to the military and law enforcement officers, as well as issued a number of new documents [8].

According to the above-mentioned Instruction, dental orthopedic care for military personnel is defined as restoration of the functions of the chewing apparatus, elimination of congenital and acquired deformities of the face and jaws through the use of various types of special prostheses, devices, which are divided into: dental prosthetics (replacement of defects of teeth and dentition and effective influence on teeth to improve their functioning); maxillofacial prosthetics (replacement of defects of bones and soft tissues of the face during the provision of surgical assistance in connection with injuries, wounds, congenital and acquired defects of the maxillofacial area); orthodontics (correction of bite anomalies and the position of individual teeth) [7]. The scope of free orthopedic dental care includes prosthetics with dental devices and prostheses made of steel, chrome-cobalt alloys and plastic. In the case of use of precious metals, electroplating and porcelain in dental prosthetics by the categories of persons specified in clause 6 of this section, only the cost of such materials is paid [7].

There are various reasons why military personnel seek orthopedic dental care: removal of an orthopedic structure for the purpose of further treatment by a dentist-therapist, manufacture of new dental orthopedic structures, complaints about unpleasant sensations in the oral cavity due to prostheses, etc. [9].

THE AIM

The purpose of our work was to substantiate the choice of the construction material of dental prostheses, taking into account the clinical picture and concomitant diseases in military personnel who required orthopedic treatment, as well as to study of the reasons and dynamics of the servicemen's request for orthopedic dental care.

MATERIALS AND METHODS

Special medical orthopedic care of level 3-4 is provided in specialized military medical departments and civilian dental institutions. The clinical and scientific base of the research was the department of post-graduate education of dentists-orthopedics, which is located on the basis of the communal enterprise "Poltava Regional Center of Stomatology - Dental Clinical Polyclinic" and provides consultative and specialized orthopedic care of various levels of complexity.

Examination and prosthetic fitting of 185 military personnel who were treated in a hospital and on rotation in the Poltava region and who sought help on their own between March 2022 and March 2023 were carried out, of which 121 people indicated problems related to the use of metal prostheses, which made it possible to assign them to the risk group of intolerance to dental materials of prostheses. In turn, this group was divided into three clinical subgroups taking into account their somatic status and the presence/absence of complaints and referrals to clinics due to prosthetics for the selection of appropriate treatment and materials.

Methods: general clinical and special methods of examination of patients; content analysis for the analysis of regulatory and legal provision of dental care for military personnel; bibliosemantic for the analysis of literary sources; medical and statistical for the calculation of derived values.

RESULTS

Employees of the department carried out an examination and prosthetics of 185 military men who were being treated in a hospital and on rotation in the Poltava region, in the period from March 2022 to March 2023.

At the first stage of the research, we studied the distribution of patients who sought dental care by referral. The largest number of patients for orthopedic treatment were sent by the Poltava Military Hospital - 144 (77.8%). the number of servicemen who applied to the polyclinic registry - 28 (15.1%), self-referrals to the doctors of the department of orthopedics - 13 (7.0%) (Fig 1).

We also studied the dynamics of the number of requests during the year: self-referrals for dental care almost did not change), but the number of people referred by the military hospital increased monthly (from 4 people in March 2022 to 20 people in March 2023 (table I, fig 2).

The insignificant number of self-referrals is most likely due to the fact that patients are not fully aware of the need to maintain oral health (including through timely prosthetics), or do not consider it so necessary to waste time. The reason for this is the low awareness of the population about the importance of restoring the integrity of the tooth rows for the normal functioning of the gastrointestinal tract [10].

A significant number of patients sent by the hospital for treatment is explained, firstly, by the active hostilities on the territory of our country and the monthly increase in the number of military personnel who need specialized help, and secondly, by the fact that the patients undergo a comprehensive examination at the hospital, revealing including dental problems and, if necessary, they are sent to a dentist for treatment, as well as the fact that in the field conditions of military stay, the occurrence or exacerbation of existing diseases of the mucous membrane and periodontal tissues is possible.

Table I. Distribution of patients by referral

Month	Referral from the military hospital	Self-referral to the polyclinic	Self-referral to the specialists of the Department of Orthopedic Dentistry
March, 2022	4	1	-
April, 2022	8	1	-
May, 2022	9	2	1
June, 2022	11	2	1
September, 2022	12	2	2
October, 2022	13	2	2
November, 2022	15	3	1
December, 2022	16	3	2
January, 2023	18	4	2
February, 2023	18	4	1
March, 2023	20	4	1
In total	144	28	13

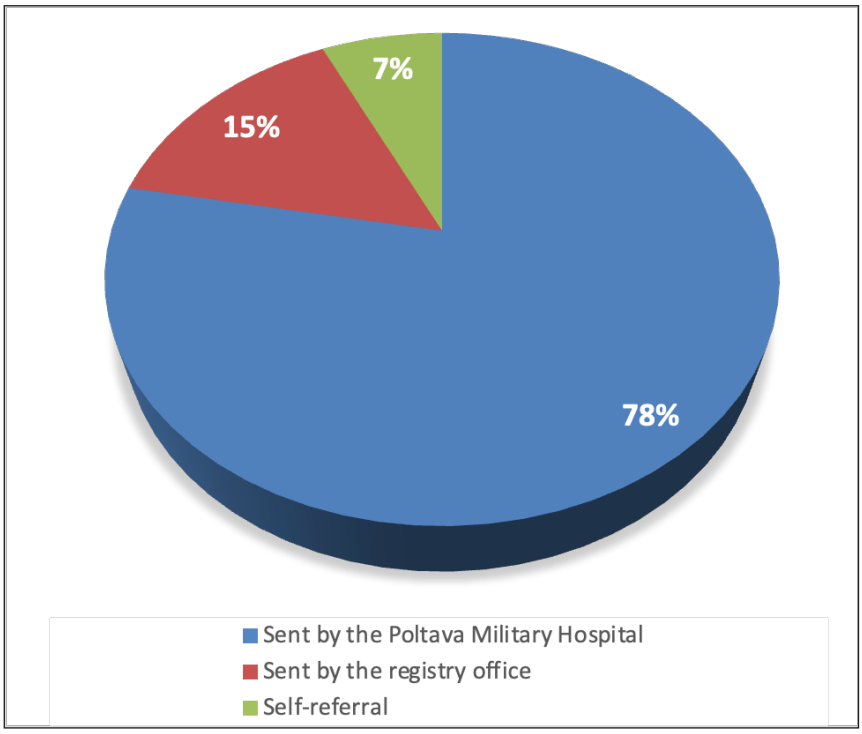

Fig. 1. The ratio of the number of patients by referral

All patients who came to us for dental care had previously been fitted with fixed metal prostheses. Among them, 121 people indicated problems related to the use of metal prostheses: a bitter taste in the mouth, increased salivation, dryness of the mucous membrane, burning of the tongue, lips, cheeks, palate, difficulties during swallowing, "fatigue" of the chewing muscles. , decreased appetite. The presence of such complaints allowed us to single out these patients in the risk group of intolerance to dental materials of prostheses. These patients were invited for examination. Out of 121 patients, 32 (26.5%) had a complicated somatic status (all of them had a history of the following diseases: pathology of the gastrointestinal tract, endocrine system, vegetative-vascular disorders, diseases of the cardiovascular system), 89 (73.5%) were with somatically uncomplicated status.

Next, taking into account the somatic status of patients and the presence/absence of complaints and appeals due to the quality of prosthetics, we formed three clinical groups.

The first group, somatically complicated, included 32 people (26.5%). In these patients, we observed changes in the mucous membrane of the oral cavity: hyperemia of the gingival margin, dryness of the mucous membrane, and a decrease in the amount of saliva.

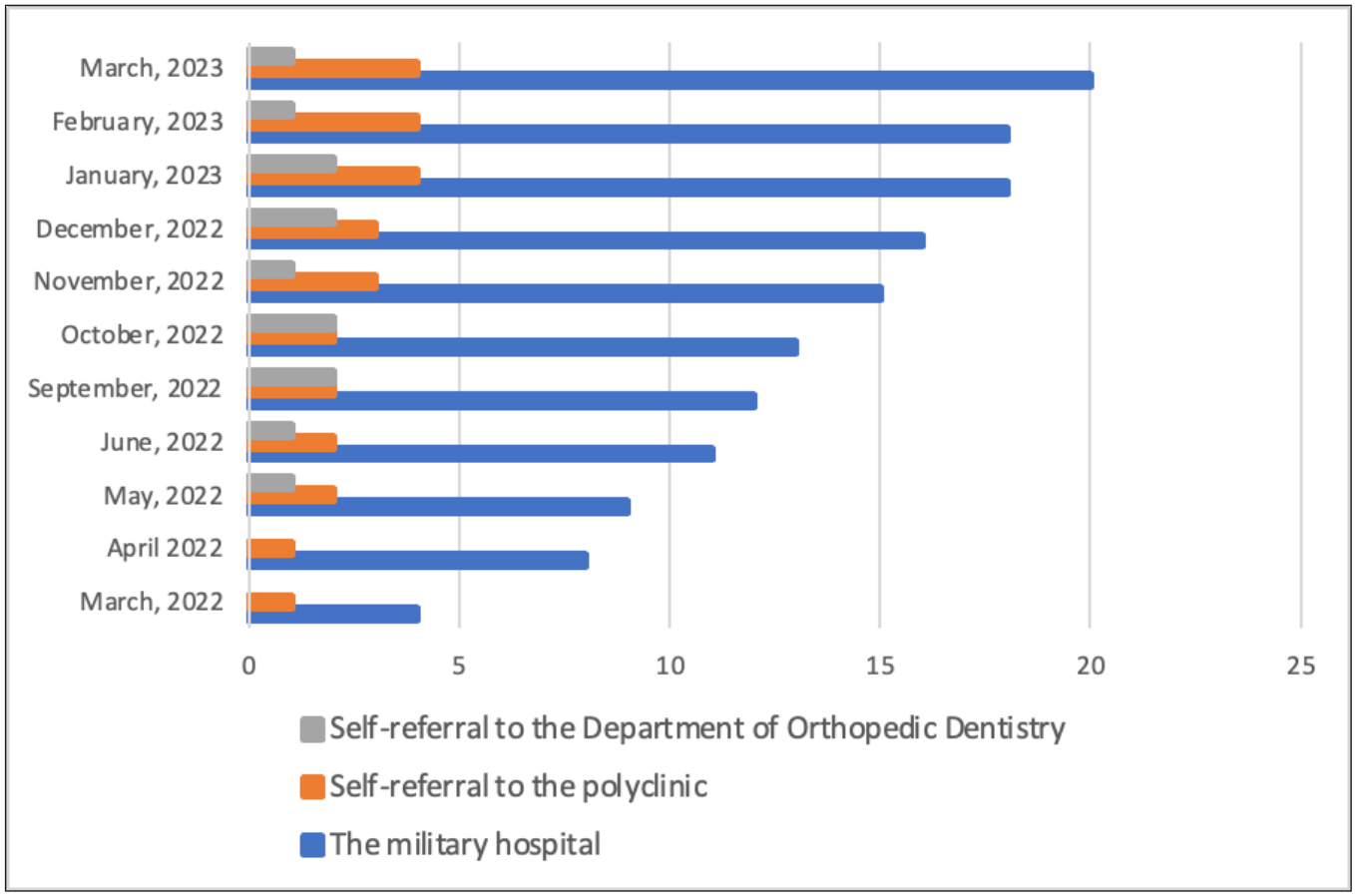

Fig. 2. Dynamics of the number of referrals to the hospital and independent appeals of the military for orthopedic help

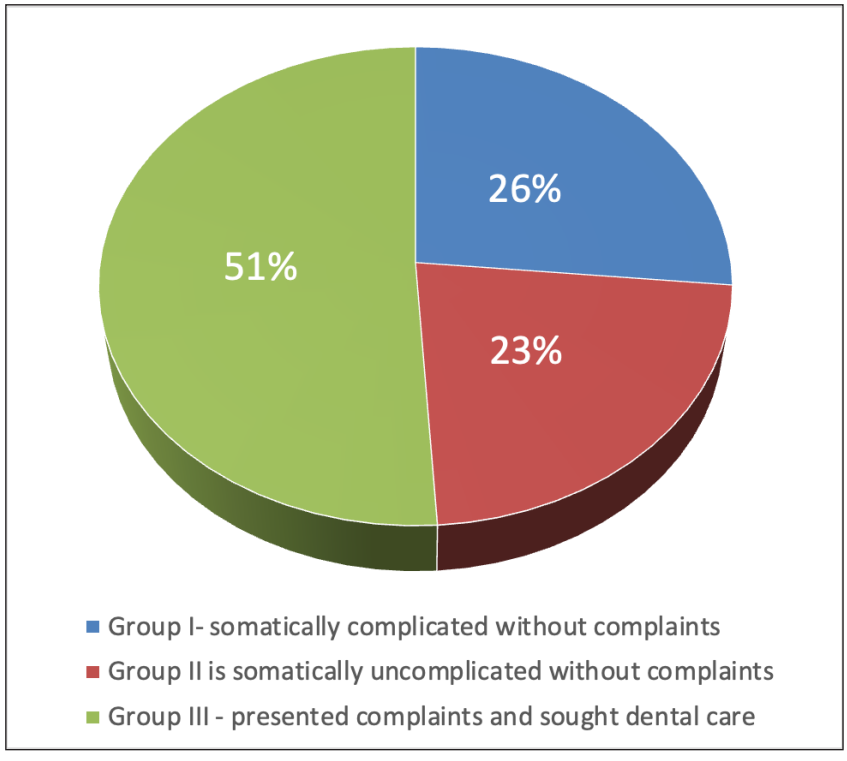

Fig. 3. The ratio of the number of patients of the risk group

The second group, 27 patients (22.3%), consisted of individuals with similar objective tissue changes of the prosthetic bed, but somatically uncomplicated status.

Patients of the first and second groups did not apply to dental clinics with complaints about the quality of prosthetics after fixing the metal structures on cement.

The third group, 62 patients (51.2%) with a somatically uncomplicated status, included persons who had previously turned to dentists with complaints about the specified symptoms or about problems with dental prostheses. Objectively: the presence in the oral cavity of acute, in some patients - chronic inflammatory periodontal diseases, tooth mobility of the 3rd degree (Fig 3).

Based on the above, it can be assumed that the somatic status of patients did not have a significant impact on the consequences of prosthetics with metal structures and the presence/absence of patient complaints.

However, this division into groups was determined by different clinical approaches to prosthetics and material selection.

Thus, from the formed risk group, 51.2% of patients complained about the quality of prosthetics, and the objective picture of their oral cavity met the criteria of patients diagnosed with "intolerance of dental prostheses". The given data prove the relevance of the problem of biocompatibility of materials for the manufacture of orthopedic structures with tissues of the prosthetic bed, especially in patients with chronic periodontitis and related diseases.

In connection with the fact that 121 military personnel were included in the risk group of intolerance to dental materials, we conducted an active search for basic materials that would be biologically indifferent to the tissues of the prosthetic bed. These requirements are met by thermoplastics: nylon, polyoxymethylene, polypropylene, polyethylene, which, according to the manufacturer, are characterized by the absence of a toxic-allergic irritant and have high biocompatibility. Thus, all our patients were made partial removable prostheses made of thermoplastic material Acron, manufacturer Roko (Poland).

When choosing the designs of partial removable prostheses in patients with various dentition defects, we were guided by the need for a small number of clinical visits, which is relevant for military personnel who are on rotation and receiving treatment in the hospital.

DISCUSSION

The analysis of literary sources allowed us to monitor the toxic effect of polymeric materials on the tissues of the prosthetic bed and the body as a whole, which makes it impossible to use acrylates in patients with diseases of the mucous membrane of the oral cavity and gastrointestinal tract [11].

Any orthopedic treatment must be scientifically based, therefore 21st century dentistry uses biologically compatible materials in its arsenal. Dental prosthetics is considered effective when restoring aesthetics and function, taking into account the biocompatibility of structural dental materials. Most of the failures in prosthetics are related to the nature of the intolerance of structural materials [12]. Unfortunately, metal dental prostheses have disadvantages associated with the increased sensitivity of some patients to their components, which is confirmed by the presence of signs of intolerance to metal structures in 77.8% of the examined. The mechanism of occurrence of this pathology is multipathogenetic and largely depends on the condition of the patient's body. Galvanosis phenomena are quite often observed in patients with gastrointestinal pathology, which worsens the course of the underlying disease and makes it impossible to use most metal alloys for the manufacture of dental prostheses [13].

One of the most significant negative factors of acrylic polymers is microporosity, which leads to a change in the quantitative and qualitative composition of the microflora of the oral cavity and the emergence of dysbacteriosis. On the surface of acrylic prostheses, as a result of impaired self-cleaning of the mucous membrane, the growth and reproduction of pathogenic microflora occurs: Staphylococcus aureus, Pseudomonas aeruginosa, fungi of the genus Candida. It has been established that acrylic plastic is most susceptible to their destructive action, and structures made of it become a permanent depot for microorganisms [4, 14]. As a result, the acrylic base of the prosthesis is an inducer of the reproduction of microorganisms and the appearance of an unpleasant odor from the oral cavity [15, 16].

Even with the most careful observance of the technology of manufacturing structures based on polymethyl methacrylate, residual monomer is noted in the base, which is released from the prosthesis for 5 years and causes the appearance of a number of toxic-allergic reactions in the oral cavity [17].

From the basic dental materials that would be biologically indifferent to the tissues of the prosthetic bed, we settled on thermoplastics, which, according to the manufacturer, are characterized by the absence of a toxic-allergic irritant and have high biocompatibility, which, as noted by a number of authors, is especially relevant for patients with diseases mucosa of the oral cavity, gastrointestinal tract, immune, endocrine, and nervous systems [17, 18].

CONCLUSIONS

1. The percentage of complications of permanent prosthetics with metal structures with signs of bioincompatibility remains quite high - 65.4% of the total number of examined servicemen, which is manifest-

ed by the complaints of patients and the results of the examination.
2. Among 121 patients with clinical signs of intolerance to denture materials, 51.2% had a more severe course of the reaction of the tissues of the oral cavity, which prompted them to turn to the dental clinic with complaints.
3. Prosthetics of such patients should be performed with basic materials that would be biologically indifferent to the tissues of the prosthetic bed. The material of choice in our case was thermoplastics.
4. The somatic status of the patients had no significant effect on the course of the reaction of intolerance to the materials of the prostheses.
5. The insignificant number of self-referrals for help is explained by the fact that patients are not fully aware of the need to maintain the health of the oral cavity (including due to timely prosthetics), or do not consider it so necessary to waste time, which occurs due to low awareness..

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The work is a fragment of the research topic of the Department of Postgraduate Education of Orthopedic Dentists of the Poltava State Medical University (Ukraine) «Individual approach to the rehabilitation of patients with pathology of the maxillofacial system» (state registration number 0122U002533).

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Conflict of interest:
The Authors declare no conflict of interest.

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Received: 15.10.2022
Accepted: 26.04.2023

A - Work concept and design, **B** – Data collection and analysis, **C** – Responsibility for statistical analysis, **D** – Writing the article, **E** – Critical review, **F** – Final approval of the article