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Mariana Ilkiv
Department of Surgical Dentistry, Ivano-Frankivsk National Medical University, Ivano-Frankivsk, Ukraine

Corresponding Author:
Mariana Ilkiv
Department of Surgical Dentistry, Ivano-Frankivsk National Medical University, Ivano-Frankivsk, Ukraine

The use of magnesium preparations in surgical treatment of generalized periodontitis

Mariana Ilkiv

Abstract
The paper is aimed at increasing the efficiency of surgical treatment by optimizing the postoperative period, minimizing the body's response to operative wound, and improving diagnostic and therapeutic approaches in surgical treatment of stage II-III generalized periodontitis.
Materials and methods: The efficiency of treating patients with generalized periodontitis using magnesium preparations, a synthetic hydroxyapatite Kergap in surgical treatment was compared by the degree of tooth mobility, the papillary marginal attached index, and the level of C-reactive protein.
Results: The clinical picture was characterized by positive changes in all clinical indicators on the 7^{th}-8^{th} days, 1 and 3 months after treatment.
Conclusion: Clinical efficiency of using magnesium preparation and hydroxyapatite Kergap in surgical treatment of generalized periodontitis was confirmed by the stabilization of the pathological process in periodontal tissues.

Keywords: Stage II-III generalized periodontitis; comprehensive treatment; magnesium; hydroxyapatite Kergap

1. Introduction
Periodontal diseases are one of the most important challenges facing modern dentistry due to their high prevalence among the adult population worldwide. A high prevalence of generalized periodontitis (GP), its severe clinical course, and a lack of effective treatment methods determine the need to search for new, more effective treatment methods [1]. Generalized periodontal diseases are accompanied by changes in the immune defense mechanisms of the oral cavity and manifest themselves as a progressive inflammatory destruction. Modern life is associated with a sedentary lifestyle, psycho-emotional stress, social problems, environmental affection, and other factors resulting in the imbalance of the hormonal system and other bodily functions. Both local and general factors are involved in the etiology and pathogenesis of periodontal diseases that determines the need for comprehensive treatment of GP. Therefore, the improvement of treatment methods for periodontal diseases is relevant, the significance and efficacy of surgical treatment in particular [2, 3].
According to the literature, macro- and microelements, magnesium in particular, are osteotropic and are involved in the genesis of highly mineralized tissues. In GP, bone tissue (BT) demineralization followed by the loss of mineral salts, namely calcium, magnesium, zinc, iron salts, is known to occur [4]. Therefore, much attention is paid to the relation of degenerative and inflammatory periodontal diseases and their pathogenesis, namely BT metabolism, osteoblast activation, impaired collagen synthesis and inhibition of BT mineralization. Neutrophilic granulocytes are involved in the development of periodontal inflammation as well. They are cells that, under certain conditions, attack periodontal tissues, thereby maintaining high level of local inflammation and are directly involved in damaging the attachment between the tooth and gingival tissues. Thus, more aggressive clinical course of periodontal inflammation may be observed in reduced magnesium concentration. Magnesium can reduce neutrophilic granulocyte activity, stabilize their membranes and, correspondingly, reduce free radical formation. It has anti-inflammatory, osteotropic, sedative, analgesic, anticonvulsant, antispasmodic, choleretic effects. The role of magnesium in the development, progression and clinical course of periodontal disease is disputable. Magnesium is a regulator of the biochemical and physiological processes in the body and belongs to 12 structural elements that constitute 99% of element composition of the human body [5, 6]. It reduces the excitability of the nervous system, is anti-inflammatory and anti-allergic factor, helps protect the body against infections. Pharmacological regulation of the end-stage of inflammation and

the proposed strategy to search for and develop a new generation of anti-inflammatory drugs are a new strategy for treatment of inflammatory diseases. The role of magnesium in surgical treatment of GP is relevant and requires further study [6, 7].

An important indicator of the intensity of the inflammatory process and the activity of GP clinical course is C-reactive protein (CRP) referred to as acute-phase protein [8, 9]. In a healthy human, salivary CRP level is normally quite low. In bacterial infection, tissue damage, necrosis, its concentration increases drastically (within the first 6-8 hours) and significantly within the next hours (by 20-100 times).The ability of CRP to respond to tissue damage resulted in its wide use as a marker of surgical efficacy in general surgery and dentistry [10].

The purpose of study was to evaluate the efficacy of using magnesium preparations in GP treatment.

Materials and methods

Inclusion criteria were stage II-III GP (pathological pockets > 5.5 mm), need for surgical treatment, no clinically manifested comorbidity. The study included 40 patients with stage II-III GP at the age of 38-64 years. Group A (the main group) included 17 patients who received magnesium preparations and underwent flap surgery using a hydroxyapatite Kergap. Group B (the comparison group) comprised 11 patients who underwent surgery using a hydroxyapatite Kergap without receiving magnesium preparations. The control group included 11 patients without clinical signs of periodontal pathology. There were selected the following observation periods: before treatment, on the 2^{nd}-3^{rd} days, 7^{th}-8^{th} days, 1 and 3 months after treatment.

The state of periodontal tissues was evaluated using clinical indices, namely the level of attachment, the degree of bleeding and mobility, the periotestometry method and the following laboratory parameters: leukocyte migration in the oral cavity by the Yasynovkyi's test, the determination of CRP with a latex diagnosticum (in oral fluid) by means of CRP-Latex Reagents (LLP Research and Production Laboratory Granum, Kharkiv) and X-ray results. Tooth mobility was measured by the periotestometry method by means of an electrical measuring instrument – the Periotest-M (automatic impulse technique) (Fig.1). Standard examination scheme was used. The program of the device provides for automatic hitting the vestibular surface of the tooth with a small tapping head (at a rate of 4 beats per second).

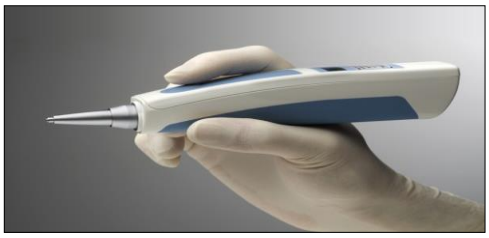

Fig 1: Electrical measuring instrument – the Periotest-M

Once the button is pushed, the tapping head starts hitting the tooth examined at intervals of 250 microseconds. An impulse is transmitted to periodontal tissues and is reflected from them. The higher periodontal fiber elasticity, the higher the damping characteristics of the periodontal attachment apparatus, and the less duration of tapping head contact with the tooth surface is. The Periotest's scale includes 58 values ranging from -8 to +50.

All the patients examined received standard therapy for GP. The oral cavity and periodontal pockets were irrigated with antiseptic preparations from 2 to 4 times a day. In addition, local treatment included topical application of dental gel Metrogyl Denta (Unique Pharmaceutical Laboratories, India; Registration No. UA/2871/01/01 of March 20, 2015) with a stable 0.25% chlorhexidine concentration and 10% metronidazole concentration. Local treatment was completed with the application of the Solcoseryl Dental Adhesive Paste (ICN Switzerland AG, Switzerland; Registration No.UA/13026/01/01 of July 12, 2013.) Multivitamins were prescribed. All the patients received 1 tablet of the complete multivitamin complex Duovit (KRKA d.d., Novo mesto, Slovenia) after meal for 1 month; in addition, magnesium preparations were prescribed, the patients of Group A received 1 tablet of Magnicum (Public Joint-Stock Company, Kyiv Vitamin Factory, Ukraine) twice a day.

Moreover, at the initial stage of treatment, all the patients were taught on proper oral hygiene care and individual oral hygiene means were selected. Traditional flap surgery was used. Once anaesthesia was conducted, and the muco-osseous flaps were formed with the maintenance of all the principles of maximum blood supply preservation, the infected granulation tissue and subgingival calculus deposits were removed. Sutures were used to secure the muco-osseous flaps back in place. All the patients were examined on the 2^{nd}-3^{rd}, 7^{th}-8^{th} days after surgery to control wound healing process (registration of postoperative complications in case of their presence, divergence of wound margins, severity of pain syndrome, inflammatory response, signs of wound infection) and treat the wound surface with drugs. The sutures were removed on the 8^{th}-10^{th} days depending on individual clinical case.

Statistical analysis was performed using the standard software package Statistica for Windows 12.0 (Stat Soft, Tulsa, OK, USA). To create a database, there was used MS Office Excel 2007 editor.

Results and discussion

The postoperative period was uneventful. In the main group, on the 2^{nd}-3^{rd} days, there were observed slight swelling in the intervention area and partial hyperemia which reduced on average over 1-3 days. The sutures were removed on the 8^{th} - 10^{th} days. After surgery, an improvement in the clinical condition including gum colour changes and disappearance of inflammation signs were observed in all the groups. Pronounced edema, moderate tenderness, and oral mucosal hyperemia were observed only in individual patients on the 2^{nd}-3^{rd} days; however, they disappeared in 2-3 days. In a month, the absence of complaints or pain, wound healing by primary intention, a pale pink colour of the oral mucosa without sign of the inflammatory process were noted. The study of the periodontal status of the teeth in the patients of Group A revealed the reduction in the indicators characterizing the inflammatory process as compared to the patients of Group B and the control group that indicated the positive anti-inflammatory effect of magnesium in the area of surgical intervention, as well as on the clinical course of GP in general (Table 1).

Table 1: Clinical and laboratory efficacy of using magnesium in surgical treatment of GP

Patients with stage II-III GP		PMA(%)	Leukocyte migration in the oral cavity by the Yasynovkyi's test (cells/mm^3)
Control group (clinically healthy periodontium, n=11)		-	117.87±3.27
Group A (n=17)	Before treatment	49.6±2.53*	345±12.43*
	On the 7th-8th days of treatment	13.5±1.98* º	131±3.27*
	1 month after treatment	8.2±0.13* º	135±4.18 º
Group B (n=11)	Before treatment	49.6±1.53*	345±12.43*
	On the 7th-8th days of treatment	23.5±0.47*	134±2.13*
	1 month after treatment	18.6±2.04*	165±3.54*

Notes:
* - a statistically significant difference as compared to the indicators of healthy individuals ($p<0.05$);
º - a statistically significant difference as compared to the indicators of Group B ($p<0.05$);
PMA – the papillary marginal attached index.

Special attention was paid to the study of tooth mobility as the main criterion for anatomic and physiological periodontal repair. The X-ray picture of the bone in a certain area, the height of the interdental septum, the state of the bone pocket are, undoubtedly, important characteristics of the periodontium; however, tooth mobility is the marker that unites and represents laboratory findings. It is the normalization of tooth mobility that may indicate the elimination of the inflammatory process, the restoration of blood supply, metabolic processes, functional load on periodontal tissues. Currently, due to periotestometry, we have new opportunities for evaluating this indicator both in norm and in case of pathological changes in the periodontium. The study of diagnostic value of tooth mobility in surgical treatment of stage II-III GP is of special interest (*Table 2)*.

Table 2: Tooth mobility in patients with stage II-III GP (points) under the influence of treatment on the 3rd month after surgery (M±m)

Mobility indicators, points	Patients with stage II-III GP	
	Group A (n=17)	Group B(n=11)
Maxillary molars before treatment	+16.21 ±0.45	+16.17 ±0.34
Mandibular molars	+15.37 ±0.54!	+17.38 ±0.16
Maxillary premolars	+14.36 ±1.39!	+17.94 ±0.11
Mandibular premolars	+12.35 ±1.64	+14.61 ±0.49
Maxillary incisors	+17.42 ±0.49	+17.29 ±0.27
Mandibular incisors	+14.45 ±0.43!	+17.51 ±0.13

Note: ! - a statistically significant difference as compared to the indicators of Group B ($p<0.05$)

Before treatment, there were observed no significant differences in tooth mobility among the patients with stage II-III GP. Clinical indicators of tooth mobility obtained 3 months after surgery were lower in almost all groups of the maxillary and mandibular teeth as compared to those in Group B; however, a significant difference was found in the mandibular incisors and molars, and the maxillary premolars. Thus, the use of magnesium preparations in comprehensive treatment demonstrated a pronounced anti-inflammatory effect as evidenced by the results of studying clinical indices and laboratory findings in the patients of Group A.

Table 3: Saliva CRP level (mg/l) in patients with stage II-III GP under the influence of treatment (M±m)

Time of determination	Control group (clinically healthy periodontium, n=11)	Group A (n=17)	Group B (n=11)
Before treatment	7.34±0.22	217.22±11.03*	211.34±21.03*
On the 2nd-3rd days of treatment		580.54±12.61*º	725.27+12.19*
On the 7th-8th days of treatment		44.08+6.12*º	83.54±11.03*
1 month after treatment		14.80±2.07*º	37.55 ±10.03*

Notes:
* - a statistically significant difference as compared to the indicators of healthy individuals ($p<0.05$);
º - a statistically significant difference as compared to the indicators of Group B ($p<0.05$).

The results were confirmed by the data of determining saliva CRP levels in the patients of Group A as compared to the patients of Group B. The study of important indicator of the inflammatory process activity revealed a statistically significant increase in its level in all the groups after surgery; however, in the patients of Group A, saliva CRP levels were significantly lower on the 2nd-3rd, 7th-8th days and 1 month after surgery that objectively confirmed the positive anti-inflammatory effect of magnesium (*Table 3)*. The use of this preparation in comprehensive treatment of GP normalizes metabolic processes in bone tissue of the alveolar process, inhibits resorption of the interdental septa, contributes to clinical stabilization of the pathological process in periodontal tissues.

Conclusion

Magnesium preparations are an important component of improving the efficiency of pharmacological support for surgical treatment of GP.

The determination of saliva CRP level is an effective diagnostic criterion for surgical treatment of GP and an objective quantitative indicator of the postoperative course assessment.

When used in surgical treatment of GP, magnesium preparations have pronounced anti-inflammatory effects as evidenced by the results of clinical and laboratory

investigations.

The use of magnesium preparation in comprehensive treatment of patients with stage II-III GP improves the postoperative course, stimulates the reparative and restorative processes in periodontal tissues and increases the efficiency of treatment.

The inclusion of magnesium preparation in surgical treatment schema allowed improving the postoperative courseand increasing the efficiency of GP surgical treatment.

References

1. Young Practitioners Guide to Periodontology. 2nd ed: British Society of Periodontology, 2012. (www.bsperio.org.uk/publications/downloads/37_162847_ypg -2nd-version-nov-12.pdf)
2. Makeyev VF, Siryy OM, Cherpak MO *et al*. Comparative experimental assessment of the reparative osteogenesis in osseous defects of the jaws, filled with various osteoplastic biomaterials. Novyny stomatolohii. 2010; 1:42-45.
3. Staudte H, Kranz S *et al*. Comparison of nutrient intake between patients with periodontitis and healthy subjects. Quintessence Int. 2012; 43:907-16.
4. Shvets AI. Antherrosthetic osteoplastic correction of orthopedic bed of jaws with application of bioceramics “KERGAP” and “Magnicolin”. Innovation in Dentistry. 2014; 3:56-59.
5. Maney P, Amornponcharoen M. Applications of plasma rich growth factors in dental surgery: a review, J. West Soc. Periodontol. Abstr. 2013; 61:99-104.
6. Shue L. Biomaterials for periodontal regeneration: a review of ceramics and polymers., Biomatter. 2012; 2(4):271-7.
7. Panda S, Ramamorthi S. Platelelet rich fibrin and alloplast in the treatment of intrabony defect [*et al.*] J.Pharm. Bioallied. Sci. 2014; 6(2):127-131.
8. Kumar A, Lal N, Singhal R. Comparativ evaluation of periosteum as a barrier membrane with and without an alloplastik bone graftin periodontal osseous defects: 9 months follow- up study, J. Indian Soc. Periodontol. 2014; 18(4):493-6.
9. Plaviuk LYu, Hereliuk VI. Dynamics of certain indicators of inflammatory process in patients with generalized periodontitis of I-II stage of development on the basis of correction of magnum preparations. Galician Medical Journal. 2011; 2:90-95.
10. Titov VN. S-reactive protein - a vector of transfer of zhirnykh acids to the cellswhich directly realize a syndrome of the systemic inflammatory response. Klinicheckaya laboratornaya diagnostika. 2008; 6:3-13.