

M.V. Anisimov, S.A. Shnaider, I.V. Anisimova, O.M. Sennikov, H.O. Babenia
SE "The Institute of stomatology and maxilla-facial surgery, National academy of medical sciences
of Ukraine", Odessa

ANALYSIS OF LOCAL CLINICAL FACTORS THAT AFFECT THE EFFECTIVENESS OF MANDIBULAR ANESTHESIA

e-mail: watermax84@gmail.com

For the treatment of mandibular teeth in adult patients, mandibular anesthesia is used in more than 80 % of cases. The method of SN Weisblat (in domestic literature or inferior alveolar nerve block - AB - in foreign literature) is the most frequently used, but rather difficult in terms of variability of reference points. We have proposed the Back Low technique, in which the needle is located behind the alveolar part of the mandible in the projection of the anterior margin of the coronal process, and the target point in this technique will be in the lower pterygomandibular spaces and 1 cm below the mandibular foramen. Clinical observations indicate that even a small violation of the technique has a critical effect on its efficacy. The purpose of our work is to determine local factors, study their frequency and their influence degree on the clinical efficacy of mandibular anesthesia in different techniques. The study involved 2,000 patients aged 18 to 65 years. Based on clinical studies, it was found that the factors that complicate carrying out mandibular anesthesia include small mouth opening (2.30 %), increased gag reflex (4.60 %), features of the structure and location of the tongue, as well as its mobility during anesthesia (7.55 %). Based on the analysis of the index of mandibular anesthesia (IMA), a decrease was found in the efficacy of mandibular anesthesia in the observed adverse factors, regardless of the technique of its implementation. Mandibular anesthesia in the Back Low technique showed higher efficacy in patients without complicating anesthesia factors – by 38 %; with a small opening of the mouth – by 47 %; with the urge to vomit – by 40 %; with "interfering" tongue – by 14 %, which makes her choice better.

Key words: small mouth opening, vomiting reflex, tongue, index of local anesthesia, anesthetic.

М.В. Анісімов, С.А. Шнайдер, І.В. Анісімова, О.М. Сенніков, Г.О. Бабеня

АНАЛІЗ МІСЦЕВИХ КЛІНІЧНИХ ФАКТОРІВ, ЯКІ ВПЛИВАЮТЬ НА ЕФЕКТИВНІСТЬ МАНДИБУЛЯРНОЇ АНЕСТЕЗІЇ

Для лікування зубів на нижній щелепі у дорослих пацієнтів, мандибулярна анестезія використовується в більш ніж 80 % випадків. Найбільш часто використовується, але є досить складною щодо варіабельності орієнтирів, методика С. Н. Вайсבלата (у вітчизняній літературі або inferior alveolar nerve block – АВ – в зарубіжній літературі). Нами запропоновано методику Back Low, при якій місце введення голки знаходиться позаду альвеолярної частини нижньої щелепи в проекції переднього краю віцевого відростка, а цільовий пункт при даній техніці буде знаходитися в нижньому відділі крилонижньощелепних просторів і на 1 см нижче нижньощелепного отвору. Клінічні спостереження свідчать про те, що навіть невелике порушення в техніці проведення критично відбивається на її ефективності. Мета нашої роботи полягає у визначенні місцевих факторів, вивченні їх частоти і ступеню впливу на клінічну ефективність мандибулярної анестезії при різних техніках її проведення. У дослідженні брали участь 2000 пацієнтів у віці від 18 до 65 років. На підставі клінічних досліджень було встановлено, що до факторів які ускладнюють проведення мандибулярної анестезії можна віднести мале відкривання рота (2,30 %), підвищений блювотний рефлекс (4,60 %), особливості будови і розташування язика, а також його рухливість під час проведення анестезії (7,55 %). На підставі аналізу індексу мандибулярної анестезії (ІМА) встановлено зниження ефективності мандибулярної анестезії при спостережуваних несприятливих факторах, незалежно від техніки її виконання. Мандибулярна анестезія в техніці Back Low показала більш високу ефективність у пацієнтів, без ускладнюючих анестезію факторів – на 38 %; при малому відкриванні рота – на 47 %; при блювотному позиві – на 40 %; при «заважаючому» язичі – на 14 %, що робить її вибір кращим.

Ключові слова: мале відкривання рота, блювотний рефлекс, язик, індекс місцевої анестезії, анестетик.

The work is a fragment of the research project "The frequency, number and structure of complications of ineffective local anesthesia in various types of dental treatment using the most common methods of anesthesia in dentistry", state registration No. 0122U000042.

Mandibular anesthesia is the most common type of performing anesthesia not only in dentistry, but also among other medical specialties [10, 15]. Thus, for the treatment of teeth in the lower jaw in adult patients, mandibular anesthesia is used in more than 80 % of cases [8, 14]. The term "mandibular anesthesia" refers to various techniques for performing anesthesia near the mandibular process of the lower jaw, the purpose of which is to reversibly interrupt nerve conduction in the corresponding areas of the target nerves (lower alveolar, lingual, buccal) [13]. More than 25 intraoral and approximately the same extraoral methods of mandibular anesthesia are known [9, 11]. The main disadvantages of these techniques include a certain complexity of their implementation relative to the success of the manipulation itself [7]. Clinical observations unequivocally indicate that even small violations in the technique of conduction anesthesia critically affect its efficacy [3, 6]. The main condition for successful anesthesia is the presence of a sufficient amount of anesthetic solution in contact with the target nerve [4]. The fulfillment of this condition

directly depends on the amount of the administered anesthetic solution and the technique of anesthesia [12]. In clinical practice, there are a number of factors beyond the control of the doctor that makes it difficult to perform mandibular anesthesia. These include individual anatomical, physiological and behavioral characteristics of the patient [3, 4, 6]. Obviously, this is a rather serious practical and common problem in everyday dental practice, which is insufficiently covered in the specialized literature. Therefore, we consider it relevant and clinically appropriate to study local factors that make it difficult to perform mandibular anesthesia, their type, prevalence and degree of influence on the efficacy of mandibular anesthesia.

The purpose of the study was to determine the local factors that make it difficult to perform mandibular anesthesia: anatomical, physiological and behavioral, in order to study their frequency and degree of influence on the clinical efficacy of anesthesia with different techniques of its implementation.

Materials and methods. The study was carried out on the basis of the State Establishment “The Institute of stomatology and maxilla-facial surgery, National academy of medical sciences of Ukraine”. The study involved 2000 patients aged 18 to 65 years. Clinical examination of the patient's oral cavity to identify local factors that make it difficult to perform mandibular anesthesia was evaluated:

- A small opening of the mouth was considered a distance of less than 4 cm between the cutting edges of the central incisors of the upper and lower jaws with the patient's mouth as open as possible;
- Vomiting reflex was recorded during its development in mandibular anesthesia;
- A tongue was considered “interfering” if it had a disproportionately large size, overlapped the chewing surfaces of the lower teeth or occupied 2/3 of the distance between the occlusal surfaces of the molars, and when trying to fix it, made involuntary pushing movements.

In Group 1 (1000 patients), 1242 mandibular anesthesia were performed according to the IAB method [14]. In Group 2 (1000 patients), 1234 mandibular anesthesia were performed using the Back Low method [1]. All anesthesia were carried out with the drug “Artyfrin-Zdorovya” Forte 4 % (Pharmaceutical company “Zdorovye”, Ukraine) 1.7 ml 1:100 000.

Evaluation of the anesthesia efficacy was assessed using the index of local anesthesia ILA [2]:

$$ILA = (CE \times TI) \div V$$

ILA – index of local anesthesia, conventional units

CE – clinical efficacy of anesthesia, points

TI – therapeutic index of the anesthetic agent

V – volume of anesthetic solution, ml

When determining CE, a number of clinical signs of mandibular anesthesia were used (table 1), taking into account the indices of electroodontodiagnostics (EOD) using the “PULPTESTER PT1” apparatus according to the classical method [5].

Table 1

**Scheme for objective assessment of the efficacy of anesthesia in teeth and soft tissues
on the appropriate side of the lower jaw**

Anesthesia sign	Objective criterion	Points
Lip numbness	Pain when clamping the lip with tweezers between the midline and corner of the mouth	1
	No pain when clamped with tweezers, there is tactile sensitivity	3
	Pronounced asymmetry, absence of any pain sensitivity, weak tactile sensitivity	4
Numbness of the tongue and lingual surface of the gums	Pain when clamping the lateral surface of the tongue with tweezers, pain when pricking the lingual surface of the gums with a probe	1
	No pain when clamping the lateral surface of the tongue with tweezers and pain when pricking the lingual surface of the gums with a probe, weak tactile sensitivity	3
Numbness of the teeth	No difference in EOD before and after anesthesia, comparative percussion is negative, pain when exposed to cold stimuli, pain during the preparation of hard tissues of the teeth	1
	The difference in EOD values before and after anesthesia does not exceed three times, comparative percussion is positive, but not pronounced; moderate pain when exposed to cold stimuli; moderate pain during the preparation of hard tissues of the teeth, aggravated when approaching the pulp	3
	After anesthesia, EOD is not determined, there is no pain reaction to stimuli; preparation of hard tissues of teeth and opening of the pulp chamber is painless; a weak short-term pain reaction is possible when removing the root pulp, which does not affect the course of treatment and the patient's condition	8

Efficacy is evaluated according to the presented scheme by adding the points that are consistent to each of the anesthesia signs. So with a score of less than 10, anesthesia is assessed as insolvent; with 10 points – limited; with a score of more than 10 – substantial.

TI is an established pharmacological characteristic of a medicinal product and expresses the ratio of systemic toxicity to relative efficacy (for articaine – 3.33) [2].

Statistical processing of the material was carried out by the method of mathematical statistics for the analysis of the obtained data using the parametric Student's t-test. Checking the discrepancies found were analyzed at the level of significance $p < 0.05$.

Results of the study and their discussion. Over a four-year observation period in clinical practice, we have identified a number of factors that make it difficult to perform mandibular anesthesia. The most common factors were:

1. Mouth opening within 3–4cm
2. Emergence of vomiting reflex during anesthesia
3. Features of the structure and location of the tongue and its mobility during anesthesia, which we conditionally called “interfering” tongue.

The prevalence and structure of local clinical factors that make it difficult to perform mandibular anesthesia are shown in the diagram (fig. 1).

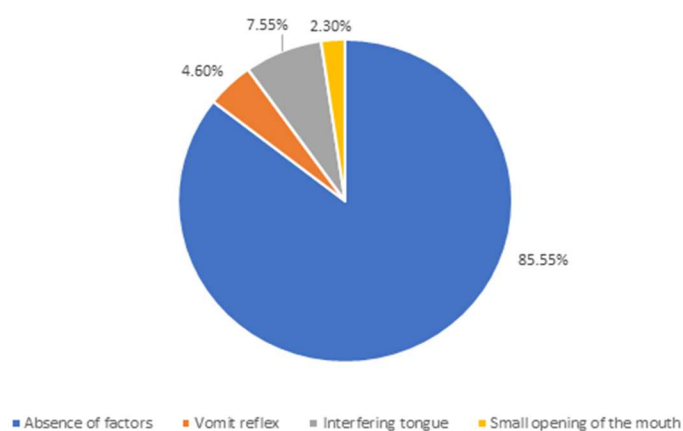


Fig. 1. The prevalence of factors that complicate the implementation of mandibular anesthesia.

During a clinical examination of 2000 people, 85.5 % (1711 patients) did not reveal any factors that impede the implementation of mandibular anesthesia.

In 7.5 % (151 patients), the presence of an “interfering” tongue was noted. In this case, we are not talking about a pathological increase in the tongue or a symptom of a general disease (although an increase in the tongue can be observed with endocrine disorders or other somatic diseases). We consider the situation as an anatomical feature of the patient, which leads to the overlap of the needle insertion point, and when trying to hold the tongue

with a finger or a spatula, the patient involuntarily makes powerful movements with the tongue, influencing the position of the syringe, its advancement and fixing the needle at the target point. It should be noted that this factor is often combined with the massive structure of the medial pterygoid muscle and its high tone. Also, in 39 patients (1.9 % of all the examined), when holding the tongue during anesthesia, the development of vomiting reflex was noted. Combined, these factors make anesthesia even more difficult to perform.

The development of vomiting reflex during anesthesia was observed in 92 people out of 2000, which amounted to 4.6 %. We divide the cause of the reflex into physical and psychological. The first include the touch of instruments to the oral mucosa. It is important to note that rejection is normal when foreign bodies enter the mouth. To eliminate discomfort in this case, distraction of the patient can help, and careful work of a specialist is also required. Usually, before the appointment, the person himself reports the problem. However, this factor can lead to interruption of anesthesia with subsequent attempts or a reduction in injection time and contributes to the forced administration of the solution. It also often forces the doctor not to reach the target point, introducing the anesthetic a little anteriorly.

If the reasons are psychological in nature, then we are talking about one of the manifestations of stomatophobia. There were fewer such patients, 1.2 % of the total. In such a situation, treatment should take place in a calm environment and with maximum comfort for the patient. This problem can be solved through the competent work of a doctor.

Three degrees of severity of the vomiting reflex were also determined.

Mild degree means the appearance of urges when the instrument touches the soft palate, the root of the tongue or its lateral surfaces. Distraction methods, local anesthesia and careful actions of specialist help. The number of patients with this feature is 36 people (out of 2000) and 39 % of the total number of patients with an “increased” vomit reflex.

With an average degree, there is a reflex to any touch in the oral cavity and, as a rule, causes significant discomfort to the patient. Anesthesia with concomitant sedation or medication preparation for

a visit to the doctor can eliminate the problem. The number of patients with this feature is 52 people (out of 2000) and 57 % of the total number of patients with an “increased” vomit reflex.

A high degree of severity is very difficult for the patient to tolerate. Vomiting can occur even with a simple opening of the mouth (at the thought of the upcoming manipulation). It is also difficult for the patient to carry out daily hygiene measures. Vomit reflex when brushing teeth greatly aggravates the situation. It is difficult for a dentist to even examine the oral cavity, not to mention the difficulties that arise during medical manipulations. This situation requires the use of general anesthesia. The number of patients with this feature was small – 4 people (out of 2000) and 4 % of the total number of patients with an “increased” vomit reflex.

Insufficient opening of the mouth occurred in 46 people among the examined, which amounted to 2.3 %.

Normally, the mouth should open 40–45 mm; this distance is approximately equal to the width of three fingers. With dysfunctions of the temporomandibular joint, the development of arthrosis, it is usually difficult to open the mouth. Another common cause of difficulty opening the mouth is muscle dysfunction (spasm of the masticatory muscles). The causes of such spasms can be different. As a rule, this is a whole range of reasons: malocclusion, stress, general skeletal disorders, etc.

This factor creates a number of difficulties, which are mainly associated with the difficulty of determining the landmarks of the needle insertion site, as well as with a clear positioning of the syringe when moving towards the target point. In most cases, this leads to a significant deviation from the target site of anesthesia, which adversely affects the localization of the anesthetic depot relative to the target nerves. This, in turn, leads to the need for additional injections to achieve pulpal anesthesia.

Because the factors we are considering make it difficult to access the target point of anesthesia, we considered it appropriate to study their degree of influence on the effectiveness of mandibular anesthesia using two methods as an example. The most commonly used, but rather complex in relation to the variability of landmarks, is the method of S.N. Weisblat (in domestic literature or inferior alveolar nerve block (AB) in foreign literature) [2, 4, 5,]. The Back Low technique (retromolar anesthesia), proposed by us and differs in the location of the target point. The needle insertion point is located behind the alveolar part of the mandible in the projection of the anterior edge of the coronoid process, and the target point for this technique will be located in the lower part of the pterygomandibular spaces and 1 cm below the mandibular foramen [1].

The efficacy of anesthesia was assessed by the ILA index. This index makes it possible to objectively assess the quality of local anesthesia, taking into account the volume and properties of the anesthetic solution to compare local anesthesia techniques, and to evaluate the influence of various factors on the efficacy of anesthesia [2]. The results of the study are shown in table 2.

Table 2

Efficacy of mandibular anesthesia (IAB, Back Low) depending on local clinical factors

Factor	V of anesthetic, ml		CE (points)		ILA, conventional units	
	Group No.1	Group No.2	Group No.1	Group No.2	Group No.1	Group No.2
Norm n1=1059 n2=1027	2.7±0.4	1.9±0.2 p≤0.05	12.1±0.9	13.7±0.7 p≤0.05	14.8±0.9	24.0±1.2 p≤0.01
Small mouth opening n1=42 n2=45	4.1±0.6 p1≤0.01	2.3±0.4 p≤0.05 p1≤0.01	11.8±0.8 p1≤0.05	12.4±0.9 p≤0.05 p1≤0.05	9.6±0.8 p1≤0.05	17.8±0.9 p≤0.01 p1≤0.05
Vomiting reflex n1=50 n2=56	3.7±0.5 p1≤0.01	2.2±0.3 p≤0.05 p1≤0.01	11.5±0.7 p1≤0.05	11.6±0.9 p≤0.05 p1≤0.05	10.3±0.8 p1≤0.05	17.2±1.1 p≤0.01 p1≤0.05
“Interfering” tongue n1=91 n2=106	3.9±0.9 p1≤0.01	2.9±0.7 p≤0.05 p1≤0.01	11.7±0.8 p1≤0.05	11.9±0.8 p≤0.05 p1≤0.05	11.9±0.9 p1≤0.05	13.9±1.3 p≤0.05 p1≤0.05

Note: In Table 2, n1 – the number of mandibular anesthetics in the IAB technique in patients of Group No. 1; n2 – the number of mandibular anesthetics in the Back Low technique in patients of Group No. 2; p – the reliability indicator is calculated in comparison with Group No. 1; p1 – the reliability indicator is calculated in comparison with the “Norm”.

Anesthesia was consistent with CE values greater than 10 points. Achieving this index was a prerequisite, as it allows for further interventions on the teeth of the lower jaw painlessly. We managed to achieve these indicators in both groups with all the observed factors, but with different amounts of anesthetic.

When analyzing the data obtained, it can be seen that the decrease in the effectiveness of anesthesia occurred in all cases in patients with the above features, regardless of the anesthesia technique. A significant

increase in the amount of used anesthetic was observed for all “obstructing” factors, however, it was most pronounced with a small opening of the mouth in the IAB technique – an average of 4.7 ml (compared to 2.7 ml in patients with normal mouth opening). While anesthesia in the Back Low technique made it possible to significantly reduce the amount of anesthetic (up to 2.3 ml on average) in patients with the same problem.

Analyzing the indicators of the ILA index, it can be concluded that in patients with such a feature as a small opening of the mouth, traditional anesthesia (in the IAB technique) is significantly difficult and the efficiency index decreases by almost 36 %. The presence in patients of an “increased” vomit reflex, features of the structure and location of the tongue, mobility of the tongue during anesthesia, also significantly reduces the ILA values – by 31 % and 20 %, respectively. When performing Back Low mandibular anesthesia, the “small mouth opening” factor reduces its effectiveness by 26 %, the “vomit reflex” factor – by 28 %, and most of all makes it difficult to perform – the “interfering” tongue factor (by 42 %). However, anesthesia using the Back Low technique showed a higher efficiency compared to the IAB technique both in patients without features (efficiency according to ILA is higher by 38 %) and in patients with factors that make anesthesia difficult: with a small opening of the mouth – by 47 %; with vomiting reflex – by 40 %; with a “interfering” tongue – by 14 %.

It should be noted that the specifics of the negative impact of local clinical factors on the effectiveness of the anesthesia techniques under consideration is primarily related to the location and target points, but always leads to a decrease in efficiency. Also, we did not observe the relationship between the side of anesthesia and its effectiveness, both in the presence of negative factors and without them. The results of the study show that the presence of local negative clinical factors and their combinations is an actual problem of practical dentistry, as it occurs in a significant number of cases, which makes it promising to further study this issue in order to improve the clinical effectiveness of mandibular anesthesia.

Conclusion

Factors that impede the implementation of mandibular anesthesia are a significant clinical problem and occur in 11.45 % of cases.

The most common adverse local factors when performing mandibular anesthesia are: features of the structure and location of the tongue, as well as its mobility during anesthesia (“interfering tongue”) – 7.55 %; the appearance of vomiting during manipulation – 4.60 %; mouth opening within 3-4 cm (small mouth opening) – 2.30 %.

A decrease in the effectiveness of mandibular anesthesia with observed adverse factors has been clinically established, regardless of the technique of its implementation. This is confirmed by an increase in the amount of anesthetic in such patients by an average of 1.2 ml with the IAB technique and by 0.6 ml with the Back Low technique.

Mandibular anesthesia using the Back Low technique showed higher efficiency (according to the ILA index): in patients without factors obstructing the implementation of anesthesia – by 38 %; with a small opening of the mouth – by 47 %; with vomiting – by 40 %; with an “interfering” tongue – by 14 %, which makes her choice more preferable.

References

1. Anisimov MV. Sposib mistsevoyi retromolyarnoyi anesteziyi na nyzhniy shchelepi. Patent na korysnu model №100542, Ukrayina [in Ukrainian]
2. Anisimov MV, Anisimova LV. Porivnyuvalnyi analiz klinichnoyi efektyvnosti mandibulyarnoyi ta retromolyarnoyi metodyk znebolyuvannya zubiv za indeksom mistsevoyi anesteziyi. Colloquium-journal №19 (71), 2020. Poland, Warszawa, Annopol 4, 03-236.C. 17–19. DOI: 10.24411/2520-6990-2020-12036 [in Ukrainian]
3. Gayvoronskiy IV, Nichiporuk GI. Klinicheskaya anatomiya sudov i nervov: uchebnoe posobie. Izd. 6-e. SPb.: Izdatelstvo ELBI-SPb, 2009;136–144. [In Russian]
4. Kuzin A, Vasilyev Yu, Voronkova V, Stafeeva M. Klinicheskie rekomendatsii k vyboru metodov obezbolivaniya zubov nizhney chelyusti v terapevticheskoy stomatologii. Endodontiya Today. 2015; 13(1):52–57. [in Russian]
5. Nikolaeva EV, Petrova EV. editors. Elektroodontodiagnostika: uchebnoe posobie: MEDpress-inform, 2014: 40 <http://www.pdf.knigi-x.ru/21meditsina/157440-1-elektroodontodiagnostika-uchebnoe-posobie-pod-redakciey-ainikolaeva-evpetrovoy-izdanie-odobreno-i-rekomendovana.php> [in Ukrainian]
6. Tarasenko SV, Dydykin SS, Kuzin AV. Anatomico-topograficheskoe i rentgenologicheskoe obosnovanie provedeniya dopolnitelnykh metodov obezbolivaniya zubov nizhney chelyusti s uchetom variabelnosti ikh innervatsii. Stomatologiya. 2013; 5:44–48. [in Russian]
7. Boronat-López A, Peñarrocha-Diogo M. Failure of locoregional anesthesia in dental practice. Review of the literature. Med Oral Patol Oral Cir Bucal 2006; 11:E510–3.
8. Corbella S, Taschieri S, Mannocci F, Rosen E, Tsesis I, Del F M. Inferior alveolar nerve block for the treatment of teeth presenting with irreversible pulpitis: A systematic review of the literature and meta-analysis. Quintessence Int 2017; 48: 69–82. doi: 10.3290/j.qi.a37131.
9. Flanagan DF. The effectiveness of articaine in mandibular facial infiltrations. Local Reg Anesth. 2016; 9:1–6. doi: 10.2147/LRA.S94647

10. Ghadimi S, Shahrabi M, Khosravi Z, Behroozi R. Efficacy of articaine infiltration versus lidocaine inferior alveolar nerve block for pulpotomy in mandibular primary second molars: A randomized clinical trial. J Dent Res Dent Clin Dent Prospects 2018; 12: 97–101. doi: 10.15171/joddd.2018.015.
11. Kim C, Hwang KG, Park CJ. Local anesthesia for mandibular third molar extraction. J Dent Anesth Pain Med. 2018; 18:287–294. doi: 10.17245/jdamp.2018.18.5.287
12. Malamed SF. Handbook of local anesthesia. 7th ed. St. Louis: Mosby; 2019.
13. Rayati F, Noruziha A, Jabbarian R. Efficacy of buccal infiltration anesthesia with articaine for extraction of mandibular molars: a clinical trial. Br J Oral Maxillofac Surg. 2018; 56:607–610. doi: 10.1016/j.bjoms.2018.06.012
14. Sawadogo A, Coulibaly M, Quilodran C, Bationo R, Konsem T, Ella B. Success rate of first attempt 4 % articaine para-apical anesthesia for the extraction of mandibular wisdom teeth. J Stomatol Oral Maxillofac Surg. 2018; 119:486–488. doi: 10.1016/j.jormas.2018.06.005
15. Tsukimoto S, Takasugi Y, Aoki R, Kimura M, Konishi T. Inferior Alveolar Nerve Block Using the Anterior Technique to Anaesthetize Buccal Nerve and Improve Anaesthesia Success Rates for Third Molar Extraction: A Randomized Controlled Trial and Magnetic Resonance Imaging Evaluation. J Oral Maxillofac Surg 2019; 77: 2004–2016. doi 10.1016/j.joms.2019.04.021

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**V.I. Berezniakov, A.N. Korzh, S.B. Pavlov, G.A. Yeroshenko¹, K.V. Shevchenko¹,
A.V. Vatsenko¹, N.A. Ulanovska-Tsyba¹**
Kharkiv Medical Academy of Postgraduate Education, Kharkiv
¹Poltava State Medical University, Poltava

THE DEGREE OF INVOLVEMENT OF THE LEVEL OF CIRCULATING IMMUNE COMPLEXES AND RED BLOOD CELLS IN THE PATHOGENESIS OF COMMUNITY-ACQUIRED PNEUMONIA

e-mail: nortail@gmail.com

The paper presents the findings of the study of the degree of involvement of the level of circulating immune complexes and red blood cells in the pathogenesis of community-acquired pneumonia. Marked disorders in immunological indices of the severity degree of the disease in patients with community-acquired pneumonia have been established, which must be taken into account when diagnosing the disease: elevated circulating immune complexes level in the blood serum of patients and an increase in the total circulating immune complexes level, mainly due to an increase in the most toxigenic small- (<11 S) and medium molecular weight (11 S–19 S) fractions of the immune complexes. The higher the level of circulating immune complexes, especially small molecular weight ones, the more likely a severe course of community-acquired pneumonia is. In community-acquired pneumonia, oxidative stress and intensified generation of reactive oxygen species develop. Changes in the quantity and quality of blood corpuscles necessitate the inclusion of agents that improve blood oxygenation into standard antibacterial therapy.

Key words: community-acquired pneumonia, circulating immune complexes, erythrocytes, haemoglobin.

**В. І. Березняков, А. Н. Корж, С. Б. Павлов, Г.А. Єрошенко, К.В. Шевченко,
О.В. Ваценко, Н.О. Улановська-Циба**

СТУПІНЬ УЧАСТІ РІВНЯ ЦИРКУЛЮЮЧИХ ІМУННИХ КОМПЛЕКСІВ І ЕРИТРОЦИТІВ У ПАТОГЕНЕЗІ ПОЗАЛІКАРНЯНОЇ ПНЕВМОНІЇ

У роботі представлені результати вивчення ступеня участі рівня циркулюючих імунних комплексів та еритроцитів у патогенезі позалікарняної пневмонії. Встановлено виражені порушення з боку імунологічних показників ступеня тяжкості у хворих з позалікарняною пневмонією, які необхідно враховувати при діагностиці захворювання: підвищення рівня циркулюючих імунних комплексів у сироватці крові хворих та збільшення загального рівня ЦВК, в основному, за рахунок збільшення найбільш токсигенних дрібно- (<11 S) та середньомолекулярних (11 S–19 S) фракцій імунних комплексів: чим вищий рівень циркулюючих імунних комплексів, особливо дрібномолекулярних, тим найбільш ймовірним є тяжкий перебіг позалікарняної пневмонії. При позалікарняній пневмонії розвивається окислювальний стрес та посилення генерації активних форм кисню. Зміни кількості та якості формених елементів крові зумовлюють необхідність включення до стандартної антибактеріальної терапії засобів, що покращують оксигенацію крові.

Ключові слова: позалікарняна пневмонія, циркулюючі імунні комплекси, еритроцити, гемоглобін.

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The search for new targets for targeted therapy of pathological conditions is one of the primary tasks of contemporary fundamental and applied in medicine. It is very important that not only genes and their products (receptors, signalling molecules, etc.) can act as such targets, but also biological processes that play a key role in the pathogenesis of certain diseases. One of these universal processes is oxidative stress, which to some extent occurs in most pathological conditions and plays a crucial role in the