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## **Clinical effectiveness of local anesthesia in the treatment of acute forms of periodontitis in adolescents**

**Introduction.** Treatment of acute periodontitis is carried out after preliminary anesthesia, the effectiveness of which depends on the correct choice of the method of anesthesia and its implementation and largely depends on the psycho-emotional state of the patient, especially in adolescence.

**The aim of the study.** To determine the effectiveness of local anesthesia in the treatment of acute periodontitis in adolescents, depending on the level of basic anxiety.

**Materials and methods.** 32 patients aged 11 to 17 years with a verified diagnosis of acute periodontitis were selected for analysis, in particular, 23 patients with a high level of anxiety (71.8%), 6 with a moderate level of anxiety (18.8%), and 3 with a low level of anxiety (9.4%). All pathologies required treatment under anesthesia using conductive methods according to topography with the use of a local amide anesthetic of the articaine series, which contains articaine hydrochloride 40 mg and epinephrine hydrochloride 0.012 mg (equivalent to 0.01 mg of epinephrine) in a volume of 1.7 ml.

In all patients, the level of reactive and personal anxiety was assessed according to the method of Ch.D. Spielberger (adapted by Yu.L. Khanin). Taking into account the level of basic anxiety, the level of pain sensations was determined using a modified VAS scale before medical manipulations, 5, 10 and 15 minutes after anesthesia.

Statistical analysis of the obtained data was carried out on a personal computer using licensed programs "MS Excel 7" for the operating system "Windows" and the standard program package «STATISTICA» v. 6.0.

**Conclusions.** In the treatment of acute periodontitis, a severe pain syndrome was noted before analgesia in 39.1% of cases, significant differences between the comparison groups were found after 5 minutes (34.8%; 4.3%;  $p<0.05$ ), after 10 minutes (17.4%; 0.0%;  $p<0.05$ ), and after 15 minutes (4.4%; 0.0%;  $p<0.05$ ). Unbearable pain syndrome before analgesia was noted in 47.8% of cases, after 5 minutes 21.8% and after 10 minutes 4.4% in patients without correction, which is significantly different from similar indicators in patients after correction ( $p<0.05$ ).

**Key words:** teenagers, dental appointment, local anesthesia, acute periodontitis, psycho-emotional state, anxiety.

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## **Клінічна ефективність місцевої анестезії при лікуванні гострих форм періодонтитів у підлітків**

**Вступ.** Лікування гострого періодонтиту здійснюється після проведення попереднього знеболювання, ефективність якого обумовлена правильним вибором методу знеболювання і його виконанням та значною мірою залежить від психоемоційного стану пацієнта, особливо у підлітковому віці.

**Мета дослідження.** Визначити ефективність місцевого знеболювання при лікуванні гострих періодонтитів у підлітків в залежності від рівня базової тривожності.

**Матеріали та методи.** Для аналізу були відібрані 32 пацієнти, віком від 11 до 17 років з верифікованим діагнозом гострий періодонтит зокрема, 23 пацієнти з високим рівнем тривожності (71,8%), 6 з помірним (18,8%), та 3 з низьким рівнем тривожності (9,4%). Усі патології потребували лікування під знеболюванням із застосування провідникових методів згідно топографії із застосуванням місцевого амідного анестетика артикаїнового ряду, котрий містить артикаїну гідрохлориду 40 мг та епінефрину гідрохлориду 0,012 мг (еквівалентно 0,01 мг епінефрину) об'ємом 1,7мл.

У всіх пацієнтів провели оцінку рівня реактивної та особистої тривожності проводили згідно методики Ч.Д. Спілбергера (в адаптації Ю.Л. Ханіна).

Зважаючи на рівень базової тривожності визначали рівень больових відчуттів за допомогою модифікованої шкали VAS перед проведенням лікарських маніпуляцій, через 5, 10 та 15 хвилин після проведення анестезії.

Статистичний аналіз отриманих даних проводили на персональному комп'ютері з використанням ліцензованих програм "MS Excel 7" для операційної системи "Windows", та стандартного пакету програм «STATISTICA» v. 6.0.

**Висновки.** При лікуванні гострого періодонтиту сильний больовий синдром відмічався до знеболювання у 39,1% випадків, достовірні відмінності між групами порівняння виявлені через 5 хвилин (34,8%; 4,3%;  $p < 0,05$ ), через 10 хвилин (17,4%; 0,0%;  $p < 0,05$ ), та через 15 хвилин (4,4%; 0,0%;  $p < 0,05$ ). Нестерпний больовий синдром до знеболювання відмічався у 47,8% випадків, через 5 хвилин 21,8% та через 10 хвилин 4,4% у пацієнтів без проведення корекції, що достовірно відрізняється від аналогічних показників у пацієнтів після корекції ( $p < 0,05$ ).

**Ключові слова:** підлітки, стоматологічний прийом, місцева анестезія, гострий періодонтит, психоемоційний стан, тривожність.

**Introduction and justification of the study.** Acute periodontitis is an acute inflammatory process in the periodontium, and is characterized by sharp pain when biting a tooth, constant pulsating, growing pain in the tooth that radiates. Treatment of this pathology involves the use of analgesia. Mostly, local anesthesia is used in practical dentistry, which should ensure the patient's comfortable condition and create optimal conditions for the dentist's work. The main requirements for analgesia are the adequacy and safety of its use [1, 2].

However, even with the perfect technique of analgesia and the use of optimal drugs, the desired analgesic effect often does not occur. According to some authors, it depends on the psycho-emotional state of the patient, especially adolescence. [3-5]. The effectiveness of anesthesia in teenagers largely depends on the patient's level of basic anxiety, these factors are directly dependent. [6-9].

**The aim of the study** was to determine the effectiveness of local anesthesia in the treatment of acute periodontitis in adolescents, depending on the level of basic anxiety.

**Materials and methods.** To solve the research problems, 32 patients with a verified diagnosis of acute periodontitis were selected, in particular, 23 patients with a high level of anxiety (71.8%), 6 with a moderate level of anxiety (18.8%), and 3 with a low level of anxiety (9.4%).

On the upper jaw, acute periodontitis was most often diagnosed in the first molars (9 cases – 45.0%); in 4 second premolars (20.0%); in central incisors and first premolars (3 cases each – 15.0%) and one lateral incisor (5.0%). On the lower jaw, acute periodontitis was most often diagnosed in first molars (9 cases – 75.0%), and in 2 first premolars (16.7%) and 1 second (8.3%) premolar. All pathologies required treatment under anesthesia using conductive methods according to topography.

Conductive mandibular anesthesia was used for the treatment of 12 periodontitis on the lower jaw with the use of a local amide anesthetic of the articaine series, which contains articaine hydrochloride 40 mg and epinephrine hydrochloride 0.012 mg (equivalent to 0.01 mg of epinephrine) in a volume of 1.7 ml, and the quality of the procedure was evaluated analgesia in clinical groups.

All patients were diagnosed with pain sensations of varying severity depending on the nosological dental pathology, taking into account the subjective characteristic, that is the level of basic anxiety.

In all patients, taking into account the level of basic anxiety, the level of pain sensations was determined using a modified VAS scale. Measurements were performed before medical manipulations, 5, 10, and 15 minutes after anesthesia.

To correct the psycho-emotional state, drugs containing glycine are recommended, and some patients are recommended to take drugs based on dry valerian extract.

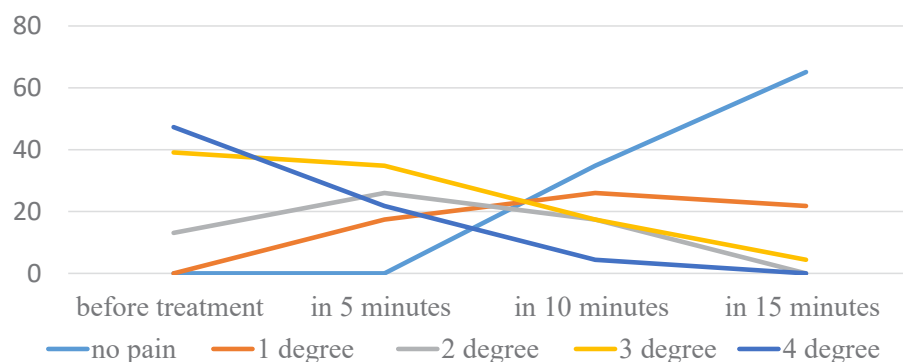
The research was carried out in compliance with the main provisions of the «Rules of Ethical Principles of Scientific Medical Research with Human Participation» approved by the Declaration of Helsinki (1964-2013), ICH GCP (1996), EU Directive No. 609 (from November 24, 1986), orders of the Ministry of Health of Ukraine No. 690 dated 23.09.2009, No. 944 dated 14.12.2009, No. 616 dated 03.08.2012. All participants were informed about the goals, organization, methods of the study and signed an informed consent to participate in it, and all measures are taken to ensure patient anonymity.

The statistical analysis of the obtained data was carried out using the methods of mathematical statistics with the determination of the mean value, the mean square deviation, the error of the mean value, the reliability of the compared values with the determination of parametric indicators, the paired and partial Pearson correlations ( $r$ ) with the confidence interval ( $p$ ) based on absolute data. All calculations were performed on a personal computer using licensed programs "MS Excel 7" for the operating system "Windows" and standard program package «STATISTICA» v. 6.0.

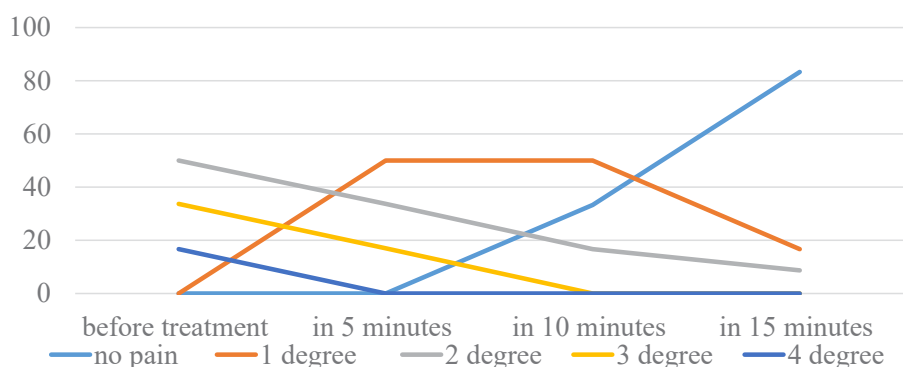
**Results and their discussion.** Investigating the intensity of pain syndrome (PS) in dental patients with a verified diagnosis of acute periodontitis using a modified VAS scale, in 100% of cases before the manipulations, the presence of PS was indicated. The intensity of pain in patients at the initial stage of testing on the VAS scale was different (Figs. 1, 2, 3; Table 1).

Before the start of treatment, only 12 patients indicated the presence of pronounced PS (intolerable degree of PS) (37.5%):  $7 < \text{VAS} \leq 10$  (red-orange shades of the VAS scale). In the group of patients with a high level of anxiety, there are 11 (47.8%) people, with a moderate level – 1 (16.7%) teenager.

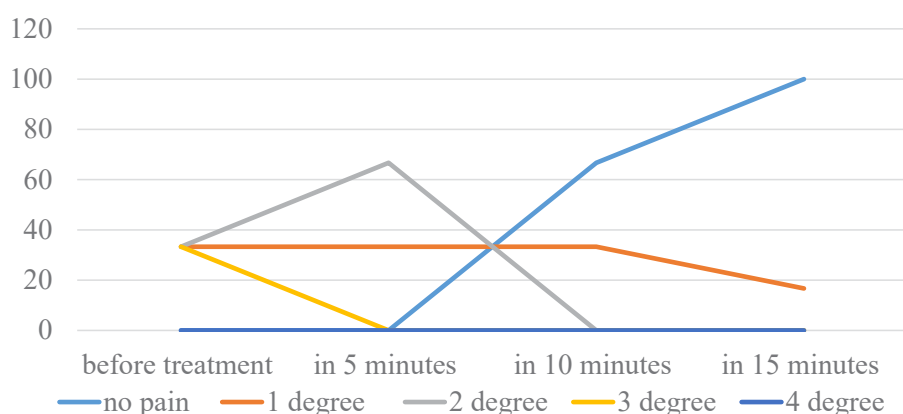
Severe PS was noted by 12 patients with  $\text{VAS} < 7$  (37.5%), of which 9 (39.1%) were from the group with



**Fig. 1. Diagram of changes in the intensity of pain syndrome in acute periodontitis in clinical groups in the dynamics of treatment in adolescents with a high level of anxiety**



**Fig. 2. Diagram of changes in the intensity of pain syndrome in acute periodontitis in clinical groups in the dynamics of treatment in adolescents with a moderate level of anxiety**



**Fig. 3. Diagram of changes in the intensity of pain syndrome in acute periodontitis in clinical groups in the dynamics of treatment in adolescents with a low level of anxiety**

high, 2 (33.3%) with moderate, and 1 (33.3%) with low level of anxiety.

Moderate intensity was noted by 7 patients (21.9%), which corresponded to 4 <VAS <7 (green and yellow shades of the scale), of which 3 (13.1%) were in the group with high, 3 (50.0%) with moderate, 1 (33.3%) with a low level of anxiety. One patient with a low level of anxiety (3.1%) characterized the intensity of the pain syndrome as “weak” and recorded it as the violet-blue part of the scale (0 <VAS ≤ 4). In all patients, a significant decrease in the intensity of PS and the frequency of its fixation in

the dynamometer was noted. After 5 minutes, an unbearable pain syndrome was recorded in 5 (21.8%) people with a high level of anxiety; after 10 minutes, unbearable pain was noted only in 1 (4.4%) teenager with a high level of anxiety, after 15 minutes PS of this intensity was not noted. The decrease in the intensity of intolerable PS was significant ( $p < 0.05$ ). Severe pain syndrome after 5 minutes was diagnosed in 9 (28.2%) teenagers, of which 8 (34.8%) had a high and 1 (16.7%) had a moderate level of anxiety; after 10 minutes in 4 (17.4%) people with a high level of anxiety; after 15 minutes – in 1 patient with a high level of

Table 1

**Assessment of the intensity of pain syndrome in acute periodontitis in clinical groups  
in the dynamics of treatment (VAS scale).**

Groups Intensity of pain syndrome VAS/NRS, mm.	1 group (n=23)		2 group (n=6)		3 group (n=3)		Total (n=32)	
	abs	%	abs	%	abs	%	abs	%
Before treatment								
No pain (0)	—	—	—	—	—	—	—	—
1 degree weak (0-4)	—	—	—	—	1	33,3	1	3,1
2 degree moderate (4-7)	3	13,1	3	50,0	1	33,3	7	21,9
3 degree strong (>7)	9	39,1	2	33,3	1	33,3	12	37,5
4 degree unbearable pain (10)	11	47,8	1	16,7	—	—	12	37,5
5 minutes after anesthesia								
No pain (0)	—	—	—	—	—	—	—	—
1 degree weak (0-4)	4	17,4*	3	50,0*	1	33,3	8	25,0*
2 degree moderate pain (4-7)	6	26,0*	2	33,3*	2	66,7	10	31,2*
3 degree strong (>7)	8	34,8*	1	16,7*	—	—	9	28,2*
4 degree unbearable pain (10)	5	21,8*	—	—	—	—	5	15,6*
10 minutes after anesthesia								
No pain (0)	8	34,8*	2	33,3*	2	66,7	12	37,5*
1 degree weak (0-4)	6	26,0*	3	50,0*	1	33,3	10	31,2*
2 degree moderate pain (4-7)	4	17,4*	1	16,7*	—	—	5	15,6*
3 degree strong (>7)	4	17,4*	—	—	—	—	4	12,6*
4 degree unbearable pain (10)	1	4,4*	—	—	—	—	1	3,1*
15 minutes after anesthesia								
No pain (0)	15	65,1*	5	83,3*	3	100,0*	23	71,9*
1 degree weak (0-4)	5	21,8*	1	16,7*	—	—	6	18,8*
2 degree moderate pain (4-7)	2	8,7*	—	—	—	—	2	6,2*
3 degree strong (>7)	1	4,4*	—	—	—	—	1	3,1*
4 degree unbearable pain (10)	—	—	—	—	—	—	—	—

\* – reliability of differences between indicators before treatment ( $p < 0,05$ ).

anxiety (4.4%). The decrease in the intensity of severe PS was significant ( $p < 0.05$ ).

The decrease in PS of moderate intensity was reliable in all clinical groups, in particular after 5 minutes in 10 (31.2%) teenagers, of which 6 (26.0%) belonged to group 1, 2 (33.3%) belonged to group 2, and 2 (66.7%) 3 groups; after 10 minutes in 5 (15.6%) teenagers, of which 4 (17.4%) belong to the 1st group and 1 (16.7%) belong to the 2nd group; after 15 minutes in 2 teenagers (8.7%) of 1 group of patients with a high level of anxiety.

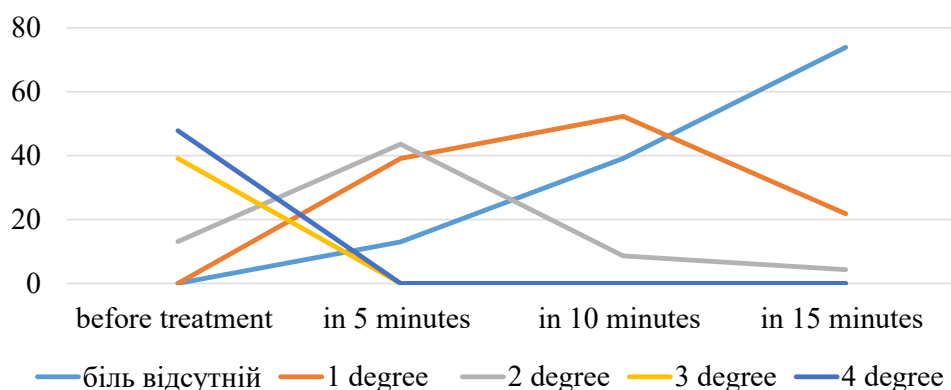
An increase in the percentage of adolescents with PS of weak intensity was observed in all groups 10 and 15 minutes after the manipulation compared to the indicators before treatment. In patients with a high level of anxiety (0.0%; 17.4%; 26.0%; 21.8%;  $p < 0.05$ ); with a moderate level of anxiety (0.0%; 50.0%; 50.0%; 16.7%;  $p < 0.05$ ); with a low level of anxiety (0.0%; 33.3%; 33.3%; 0%;  $p < 0.05$ ). Complete disappearance of PS was observed after 10 minutes in 12 (37.5%) teenagers, of which 8 (34.8%) were in the 1st group, 2 (33.3%) were in the 2nd group, and 2 (66.7%) were in the 3rd group; after 15 minutes in 23 (71.9%) teenagers, of which 15 (65.1%) were in the 1st group, 5 (83.3%) were in the 2nd group, and 3 (100.0%) were in the 3rd group.

A significant decrease in the percentage of PS intensity was observed in all clinical groups, however, in the low-anxiety group, 100% disappearance of PS was noted

in all patients after 15 minutes. In adolescents with a high level of anxiety, the decrease in the intensity of PS was reliable in comparison with the indicators before the manipulation, the complete disappearance of PS was noted in 34.8% – 8 patients after 10 minutes and in 65.1% – 15 patients after 15 minutes after anesthesia. One of the conditions for high-quality dental treatment is effective analgesia of medical manipulations, which is directly proportional to the patient's level of anxiety, especially in children and adolescents. Correction of the level of anxiety in this contingent of patients will increase the effectiveness of local anesthesia and, as a result, improve the quality of dental treatment.

The effectiveness of local anesthesia was determined in adolescents with a high level of anxiety during the treatment of acute periodontitis after correction with preparations containing glycine and valerian is shown in Figure 4.

Among 23 cases with a diagnosis of acute periodontitis, 5 minutes after analgesia, 13.0% (3 people) had no pain syndrome, 39.1% (9 cases) had mild pain, and 43.6% (10 cases) had moderate pain. PS, in 4.3% (1 case) – severe pain syndrome, unbearable PS was not noted. After 10 minutes, 39.1% (9 cases) had no pain syndrome, 52.3% (12 cases) had weak, and 8.6% (2 cases) had moderate pain syndrome. Strong and unbearable pain syndrome was not noted. After 15 minutes, no pain syndrome was diagnosed in 73.9% (17 cases), in 21.8% (5 cases) weak, and in 4.3%



**Fig. 4. Diagram of changes in the intensity of pain syndrome in acute periodontitis in teenagers with a high level of anxiety after correction of the psycho-emotional state in the dynamics of treatment**

(1 case) – moderate PS. Strong and unbearable pain syndrome was not noted. All indicators were significantly different from the percentage indicators of the strength of the pain syndrome before analgesia ( $p < 0.05$ ).

**Conclusions.** In the treatment of acute periodontitis, a severe pain syndrome was noted before analgesia in 39.1% of cases, significant differences between the comparison

groups were found after 5 minutes (34.8%; 4.3%;  $p < 0.05$ ), after 10 minutes (17, 4%; 0.0%;  $p < 0.05$ ), and after 15 minutes (4.4%; 0.0%;  $p < 0.05$ ). Unbearable pain syndrome before analgesia was noted in 47.8% of cases, after 5 minutes 21.8% and after 10 minutes 4.4% in patients without correction, which is significantly different from similar indicators in patients after correction ( $p < 0.05$ ).

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