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## Prevention Of Postsurgical Pain Syndrome In Endodontic Interventions As A Current Problem Of Modern Dentistry.

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### ABSTRACT

Acute complicated types of carious lesions of dental hard tissues take a leading position in the statistical structure of both dental and general pathologies. The development of dental industry has resulted in considerable achievements on solving the problem of the quality of endodontic treatment of such diseases. It should be noted that endodontic interventions have ultimately improved the quality of treatment of acute complicated types of carious lesions and other dental disorders. However, even at the present stage, certain aspects of this problem remain unsolved. The main one is postsurgical pain syndrome associated with the preceding acute inflammatory conditions and traumatic tissue injuries inevitable in most invasive dental procedures. It still objectively exists; it is observed in the majority of dental patients after surgery; it lasts longer than local anesthetic effects and reduces the quality of life significantly. It is fraught with complications (from the feeling of emotional discomfort to the neuralgia formation) and has not been efficiently methodologically eliminated so far. The absolute number of patients with complicated types of carious lesions who have undergone surgical procedures experience intense postsurgical pain and the accompanying feeling of emotional discomfort during the nearest postoperative period.

**Keywords:** dentistry, prevention, periodontitis, endodontic treatment, anesthesia, anxiety, postsurgical pain syndrome.

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## RELEVANCE OF THE PROBLEM

Acute periodontitis is a typical "model" disease for a group of complicated forms of carious lesions requiring surgical correction, usually in the form of endodontic intervention. Modern endodontics is divided into preventive, conservative and surgical [8,11,21].

Preventive endodontics provides a therapeutic effect on the tooth pulp in dental caries or pulpitis to prevent the development of pathological process in the pulp itself and in periodontal tissues [18]. The development of methods aimed at maintaining the viability of the pulp is characterized by the improvement of drug therapy approaches [15,23]. The tasks of preventive endodontics include the treatment of teeth without any signs of apical periodontitis by aseptic manipulations on the pulp. Conservative endodontics includes a set of measures aimed at cleansing the root canal system as well as its hermetic closure [25]. Depending on the means used, conservative endodontics is divided into instrumental and pharmacological [24,29]. Surgical endodontics is used in cases where conservative treatment is impossible or ineffective in solving problems associated with the root canal and periapical area; it is applied as an alternative but not the only rational method of endodontic treatment [3,10,28].

Acute complicated forms of carious lesions continue dominating among modern dental pathologies; acute periodontitis is typical and one of the most common diseases. The distinctive features of this pathology are a severe clinical course and a high risk of serious complications [16,27]. This circumstance leads to the necessity for active preventive measures and acute periodontitis management [6,14].

All endodontic interventions for complicated forms of carious lesions are invasive: there is a mechanical traumatic effect on the complex of periapical tissues, pulpal and periodontal tissues that have a rich innervation [4,5]. It predictably results in the initiation of nociceptive, neurovegetative and psychoemotional reactions [17,26]. This is actually confirmed by the fact that the absolute number of patients who experienced surgical interventions for complicated forms of carious lesions has pronounced postoperative pain phenomena and an associated emotional discomfort during the immediate postoperative period [12,19]. In this case, the technology of antinociceptive protection in the volume of only local anesthesia does not solve the problem completely: local anesthetics causing a reversible blocking of pain receptors by no means affect their sensitization factors (especially, prostaglandin cascade molecules that are released in the event of damage of the tissues in the treated area), which makes postsurgical pain practically unavoidable [7, 13].

It should be noted that endodontic interventions, according to the data of modern dentistry, have fundamentally improved the quality of treatment of acute complicated forms of carious lesions and other dental diseases [2,9]. The technology of their implementation in the aspect of carrying out the manipulations themselves is now quite perfect. Nevertheless, the issue of antinociceptive protection of this group of patients remains unsolved. The traditional approach in the form of local (infiltration and conduction) anesthesia prevents the development of intraoperative pain syndrome but by no means influence the development of postoperative one [1,9,20]. The latter, due to its rather pronounced expression, is obviously a powerful stress-inducing factor that limits the quality of life of patients in the immediate postoperative period, and thus reduces the quality of modern dental aid [22,30].

When analyzing the data of the theoretical review and our studies, the existence of the problem of antinociceptive protection of endodontic interventions for complicated forms of carious lesions becomes obvious.

**The aim of the study** is to assess the level of effectiveness of the developed program of antinociceptive protection in terms of preventing postoperative pain syndrome and related neurovascular and psychoemotional reactions.

## MATERIALS AND METHODS

The study involved 200 patients with acute complicated forms of carious lesions. The stratification of the participants into 2 groups of 100 people, each one of 50 men and 50 women, was carried out in accordance with the traditional approach and the antinociceptive protection technique. The standardization of the compared groups was achieved by ensuring the identity of the intra-group distribution of the participants

in accordance with gender and age, forms of acute carious complications, local anesthesia techniques. The traditional approach for endodontic intervention was used in the control group (n = 100 people): local anesthesia with articaine hydrochloride 40 mg / ml + adrenaline hydrochloride 10 µg / ml 1.7-3.4 ml; the use of ketorolac tromethamine 10-40 per os during the first day of the postoperative period. The developed approach was applied to the main group (n=100 человек): ketorolac tromethamine 30 mg in 10-20 ml of 0.9% NaCl solution iv bolus shortly before the endodontic intervention and local anesthesia (articaine hydrochloride 40 mg / ml + adrenaline hydrochloride 10 µg / ml 1.7-3.4 ml). The developed program of antinociceptive protection implements the principles of multimodal and preventive analgesia. The pain syndrome and the level of situational and personal anxiety were assessed during the follow-up period: 24 control points with a 1-hour interval during the first day after the endodontic treatment. The patients were monitored for the pain syndrome severity and the level of situational anxiety. The indices were determined according to the ratio of the number of patients with a specific index to the total number of patients in the group; they were expressed as a percentage.

## RESULTS

According to the data on the postsurgical pain syndrome intensity in the control group (n<sub>1</sub>=100 patients), the postsurgical pain syndrome dynamics is presented by 8 clinically significant phases (the total duration of pain ranges from 6.5 to 14 hours):

- 1- latent («hidden») phase – the absence of pain syndrome associated with the continuing action of local anesthesia; its duration ranges from 1 to 3 hours;
- 2- manifestation (initial manifestations of pain syndrome) – occurs within 1-3 hours after the intervention; the intensity of pain syndrome in this period is low – 1-3 points;
- 3- an increase in the intensity of pain syndrome to an unacceptable level (4 points) which occurs within the next 1-2 hours;
- 4- maximum values of pain syndrome; this occurs during the 4-6th hour after the intervention; the intensity of pain syndrome in this period is high – 6-8 points;
- 5- plateau: the maximum level of pain syndrome stays unchanged during the next 2-3 hours; it is followed by the next phase;
- 6- reduction: a partial regression of pain symptoms within the next 1-2 hours of the postoperative period; the intensity of pain syndrome is 2-4 points;
- 7- «exit» from the unacceptable level – occurs during the next 0.5-1 hour; the intensity of pain syndrome is 1-3 points;
- 8- complete recovery from pain – occurs during the last 1-3 hours of the existence of pain symptoms.

In the main group (n<sub>2</sub> = 100 patients), the patients do not actually experience postsurgical pain syndrome in case of using the developed program of antinociceptive protection (achieving the effect of "pre-emptive analgesia"). It should be concluded that, under the traditional approach, the absolute majority of patients suffer from a pronounced postsurgical pain syndrome which is most likely due to the tissue dissection in the treated area and subsequent sensitization of local pain receptors and which appears after the termination of reversible action of local anesthetics. In the context of application of the developed program, this pathological phenomenon is almost completely prevented.

When studying the level of situational anxiety in the middle of the first day of the postoperative period, the following results were obtained: in the control group (n<sub>1</sub> = 100 patients), the indicator values were 44.8 ± 5.7 points. The upper limit of normal was exceeded by 49.3%. In the main group (n<sub>2</sub> = 100 patients), the indicator values were 28.3 ± 1.7 points. The advantage over the control group was 36.8%. However, what is more important is that most patients of the group did not have an increased level of anxiety.

It should be concluded that, in the context of using the traditional approach, the absolute majority of patients after endodontic interventions for acute periodontitis have an increased level of situational anxiety associated with the presence of postsurgical pain syndrome. The optimization of postoperative analgesia in patients of this group due to the implementation of the developed program of antinociceptive protection makes it possible to normalize the level of anxiety, which proves its direct impact on the nociceptive component and its mediated (via analgesia) influence on the psychoemotional component of perioperative stress in the course of dental interventions.

## DISCUSSION

Basing on the comparative analysis of the traditional approach and the developed program of antinociceptive protection for the assessment of postsurgical pain syndrome, we may conclude that the traditional approach to antinociceptive protection of endodontic interventions for acute complicated forms of carious lesions can not be now considered optimal due to increased rates of pain and anxiety levels. The developed program of antinociceptive protection of endodontic interventions for acute complicated forms of carious lesions, on the contrary, can be recognized at the moment as an optimal solution to the problem in connection with the functional characteristics under study.

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