

EFFICIENCY OF ANTINOCYCEPTIVE SUPPORT OF PATIENTS WITH ENDODONTIC INTERVENTIONS FOR ACUTE PERIODONTITIS

Arman A Oganesan^{*1}, Satenik M Nikogosyan², Alexey N. Morozov², Alina I.

Tsyapkina¹, Irina P. Ryzhova¹

Belgorod State University¹

Voronezh State Medical University Named after N. N Burdenko²

308015, Belgorod, Pobeda Street, 85, Russia Voronezh, 10 Studencheskay, Russia

E-mail: oganesyan@bsu.edu.ru

Annotation

Caries is the most common dental pathology. This disease is extremely common and accompanies the total human population since its inception. In prognostic terms, untreated carious lesions, with the exception of "suspended caries", necessarily turn into complicated forms - pulpitis and periodontitis. It is known that periodontitis is an inflammatory disease of the connective tissue anatomical formation located in the space between the compact plate of the dental alveoli and the cement of the tooth root. In the case of unsuccessful conservative treatment or its impossibility, the issue of conservative-surgical or surgical methods of treatment - root apex resection or tooth extraction is considered. It has been proven that endodontic treatment for complicated forms of carious lesions is based on invasive intervention. In addition to stress, there are other types of adaptive reactions of the body. A natural consequence of this is the initiation of nociceptive, neurovegetative and psychoemotional reactions. The result is the formation of chronic postoperative neuropathic pain syndromes, which affects the patient's dental health and quality of life. In this case, the modulating factors are the individual characteristics of the organism and, to the greatest extent, the type of dental intervention and the adequacy of the anesthetic.

Key words: acute periodontitis, endodontic treatment, antinociceptive support.

Introduction

Acute complicated forms of carious lesions continue to occupy leading positions in the structure of modern dental pathology (Hillson, 2001, 2018). As part of this nosological group, acute periodontitis is a typical representative and one of the most common diseases. The distinctive characteristics of this pathology are a severe clinical course and a high risk of developing serious complications (Zakrzewska, 2013). This circumstance leads to the need for active treatment of acute periodontitis. In this regard, modern endodontic interventions are often an uncontested option for the optimal solution to the problem and have their own unresolved aspects that significantly affect the overall quality of dental care (Durham, Exley, John, & Nixdorf, 2013; N, 2013).

The problem is potentially solvable with the help of a qualified anesthetic management (N, V, L, & A, 2011). Improving the effectiveness and safety of analgesia in the treatment of mandibular molars. Institute of Stomatology (Su et al., 2016).

However, in outpatient dental practice, the involvement of anesthesiologists in most cases is not provided; in addition, the anesthetic aid is laborious and therefore not suitable for use in this

case; thus, the implementation of analgesia is entirely within the purview of the attending dentist (Vinckier, 2000). At the same time, existing methods of additional anesthesia after dental interventions (for example, oral or intramuscular use of analgesics) are often not effective enough (Hillson, 2001; Krippaehne & Montgomery, 1992; Su et al., 2016; Vinckier, 2000; Zakrzewska, 2013). The traditional system of pain relief in dentistry (local application, infiltration and conduction anesthesia) does not prevent the development of pain in the early postoperative period (Kaufman, Epstein, Gorsky, Jackson, & Kadari, 2005). In practice, this is confirmed by the fact that the absolute number of patients operated on for complicated forms of carious lesions have pronounced symptoms of postoperative pain and associated emotional discomfort in the immediate postoperative period (Martin, Patterson, Mittermuller, Lee, & Moffatt, 2020). The aim of the study was to evaluate the traditional approach to antinociceptive maintenance in the preoperative period of endodontic interventions for acute periodontitis for functional sufficiency.

Materials and research methods

The study was carried out in the conditions of the Voronezh State Medical University named after N.N. Burdenko Dentistry Department. Its methodological platform, according to the control points of the observation periods, included methods for obtaining empirical data.

Preoperative period: 1 point 24 hours before the planned endontic intervention. We used a method for assessing pain syndrome in patients based on modern analog-digital scales (visual analog scale, digital rating scale, mimic pain rating scale). A method was carried out for assessing the stress-induced tension of the autonomic nervous system of patients using cardiointervalography and mathematical analysis of the heart rhythm. The Spielberger scale was used to assess the level of personal and situational anxiety.

The key performance indicator (KPI) in this study refers to the performance indicators of the developed program of anti-noceptive maintenance, which assess the achievement of its clinical goals. The indicators were determined using the ratio of the number of patients with a specific indicator to the total number of patients in the group, expressed in%.

During the reporting period, the study included 200 patients with acute complicated forms of carious lesions. The study participants were stratified into 2 groups of 100 people in accordance with the applied method of antinociceptive support. Standardization of the compared groups was achieved by ensuring the identity of the intragroup distribution of study participants by age and gender, forms of acute carious complications, and methods of local anesthesia.

Endodontic treatment was the same in the compared groups and was performed in accordance with the "Patient Management Protocols" of the Russian Dental Association (Diegritz et al., 2020; Ostrc, Pavlović, & Fidler, 2021).

Local anesthesia, as a component of antinociceptive support, was the same in the compared groups, was performed according to the following methods: 1) conduction (with blocking of n. Alveolaris) + infiltration anesthesia: during interventions on teeth No. 8, 7, 6 and 5 of the lower jaw; 2) only infiltration anesthesia for interventions on the lower jaw, with the exception of teeth No. 8, 7, 6 and 5, and for any interventions on the upper jaw; articaine hydrochloride 4% with epinephrine hydrochloride in a ratio of 1: 100,000 in 1.7 ml injection cartridges was used as a local anesthetic preparation; the used dose ranged from 1.7 to 3.4 ml, in most cases - 2.55 ml of the official solution (Vavina, Koreckaya, Chirkova, Nikogosyan, & Morozov, 2015; Vinckier, 2000).

In the study of the index of the initial pain syndrome, the following results were obtained.

So, in the control group (n1 = 100 people) the indicator values were 5.3 ± 0.59 points, in the main group (n2 = 100 people) - 5.4 ± 0.58 points. It should also be noted that the initial pain syndrome (corresponding to the clinical picture of acute periodontitis) had all 100% of patients compared groups. None of them had test results on analog-digital scales less than 2 points. In addition, the level of pain syndrome exceeded the critical one (i.e., 4 points) in the absolute majority of patients in both groups (73% of the sample size in both cases).

Statistical analysis revealed the absence of significant intergroup differences in the "baseline pain level" indicator (Student's parametric t-test for unrelated samples: $p = 1.111111$).

The results demonstrate the statistical "indistinguishability" of the compared groups according to the initial the level of pain in the area of the causative tooth and, accordingly, their "suitability" for further statistical comparisons (Martin et al., 2020)

Results

In the study of the indicator of personal anxiety (LT), the following results were obtained. So, in the control group (n1 = 100 people) the indicator values were 34.6 ± 3.84 points, in the main group (n2 = 100 people) the indicator was 35.1 ± 4.81 points.

Statistical analysis revealed the absence of significant intergroup differences in the "personal anxiety" indicator (parametric Student's t-test for unrelated samples: $p = 1.111111$).

In the study of the indicator of situational anxiety (ST), the following results were obtained: in the control group (n1 = 100 people) the values of the indicator were 48.2 ± 3.13 points, in the main group the values (n2 = 100 people) - 49.1 ± 2.92 points. In both groups, the level of the indicator exceeded the upper limit of the norm (in the control group - by 26.7-100%, in the main group - by 30-103.3%).

Statistical analysis revealed the absence of significant intergroup differences in the indicator "situational anxiety" (parametric Student's t-test for unrelated samples: $p = 1.111111$)

Discussion

The results demonstrate the statistical "indistinguishability" of the compared groups in terms of the level of personal and situational anxiety and, accordingly, their "suitability" for further statistical comparisons.

The results of the study of the initial level of "intermediate" cardiointervalographic indicators of the mode, the amplitude of the mode and the

variation range in patients of the compared groups are given according to the analyzed indicators of the mathematical analysis of the heart rate, the absence of statistically significant intergroup differences is obvious (Ovechkin, 2016).

Accordingly, when studying the cardiointervallographic stress index (CSI), the following results were obtained: in the control group (n1 = 100 people), the indicator values were 543.8 ± 69.71 c.u. There was an excess of the upper limit of the norm by 165.3-302%. In the main group (n2 = 100 people), the indicator values were 544.7 ± 69.73 c.u. The upper limit of the norm was exceeded by 166-302.7%.

Statistical analysis revealed the absence of significant intergroup differences in the KIN indicator (parametric Student's t-test for unrelated samples: $p = 1.111111$).

Conclusion

1. Patients with acute periodontitis have initially pronounced pain syndrome, as well as increased values of the cardio-intervallographic index of tension and situational anxiety, which, obviously due to the clinical and pathogenetic features of acute periodontitis;
2. The revealed data prove the initial absence of statistically significant differences in pain syndrome, personal and situational anxiety, as well as the level of expression of the autonomic nervous system between patients in the control and main groups;
3. These preliminary results are an additional factor of standardization of the compared groups in terms of the initial level of "stressor" of their participants, which subsequently made it possible to reasonably make intergroup comparisons of antistress effectiveness of the traditional and developed approaches to antinociceptive maintenance.

References

- Diegritz, C., Manhart, J., Bücher, K., Grabein, B., Schuierer, G., Kühnisch, J., . . . Fotiadou, C. (2020). A detailed report on the measures taken in the Department of Conservative Dentistry and Periodontology in Munich at the beginning of the COVID-19 outbreak. *Clinical oral investigations*, 24(8), 2931-2941. doi:<https://doi.org/10.1007/s00784-020-03440-z>
- Durham, J., Exley, C., John, M. T., & Nixdorf, D. R. (2013). Persistent dentoalveolar pain: the patient's experience. *Journal of orofacial pain*, 27(1). doi:<https://doi.org/10.11607/jop.1022>
- Hillson, S. (2001). Recording dental caries in archaeological human remains. *International Journal of Osteoarchaeology*, 11(4), 249-289. doi:<https://doi.org/10.1002/oa.538>
- Hillson, S. (2018). Dental pathology. *Biological anthropology of the human skeleton*, 293-333. doi:<https://doi.org/10.1002/9781119151647.ch9>
- Kaufman, E., Epstein, J. B., Gorsky, M., Jackson, D. L., & Kadari, A. (2005). Preemptive analgesia and local anesthesia as a supplement to general anesthesia: a review. *Anesthesia progress*, 52(1), 29-38. doi:[https://doi.org/10.2344/0003-3006\(2005\)52\[29:PAALAA\]2.0.CO;2](https://doi.org/10.2344/0003-3006(2005)52[29:PAALAA]2.0.CO;2)
- Krippaehne, J. A., & Montgomery, M. T. (1992). Morbidity and mortality from pharmacosedation and general anesthesia in the dental office. *Journal of Oral and Maxillofacial Surgery*, 50(7), 691-698. doi:[https://doi.org/10.1016/0278-2391\(92\)90099-L](https://doi.org/10.1016/0278-2391(92)90099-L)
- Martin, H., Patterson, B., Mittermuller, B.-A., Lee, V., & Moffatt, M. E. K. (2020). The effectiveness of silver diamine fluoride and fluoride varnish in arresting caries in young children and associated oral health-related quality of life. *J Can Dent Assoc*, 86(k9), 1488-2159.
- N, A. E. (2013). Improving the effectiveness and safety of analgesia in the treatment of mandibular molars. *Institute of Stomatology*. 58(1), 62-64.
- N, A. E., V, O. E., L, V. e. J., & A, B. c. A. (2011). Razrabotka sposoba obezbolivaniya moljarov nizhnej cheljusti pri lechenii kariesa i ego oslozhnenij // Endodontija today. 2011; 4: 64-67. (In Russian). 4, 64-76.
- Ostrc, T., Pavlović, K., & Fidler, A. (2021). Urgent dental care on a national level during the COVID-19 epidemic. *Clinical and Experimental Dental Research*, 7(3), 271-278. doi:<https://doi.org/10.1002/cre2.383>
- Ovechkin, A. M. (2016). Chronic postoperative pain syndrome-«a pitfall» of modern surgery. *Regional anesthesia and acute pain management*, 10(1), 5-18. doi:<https://doi.org/10.18821/19936508-2016-10-1-5-18>
- Su, N., Li, C., Wang, H., Shen, J., Liu, W., & Kou, L. (2016). Efficacy and safety of articaine versus lidocaine for irreversible pulpitis treatment: a systematic review and meta-analysis of randomised controlled trials. *Australian Endodontic Journal*, 42(1), 4-15. doi:<https://doi.org/10.1111/aej.12125>
- Vavina, E. P., Koreckaya, I. V., Chirkova, N. V., Nikogosyan, K. M., & Morozov, A. N. (2015). Sovremennyy vzglyad na osnovnye aspekty uspeshnogo ehndodonticheskogo lecheniya [A modern take on the basic aspects of a successful endodontic treatment]. *Nauchno-medicinskij vestnik Central'nogo CHernozem'ya*, 62, 3-8.
- Vinckier, F. (2000). What is the cause of failure of local anesthesia? *Revue belge de médecine dentaire*, 55(1), 41-50.
- Zakrzewska, J. M. (2013). Differential diagnosis of facial pain and guidelines for management. *British journal of anaesthesia*, 111(1), 95-104. doi:<https://doi.org/10.1093/bja/aet125>