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MICROBIOLOGICAL EVALUATION OF ROOT CANALS MEDICAMENTAL CLEANSING IN PERIODONTITIS

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The purpose of the study was to assess the efficacy of final medicamental cleansing root canals of teeth in periodontitis. In total 58 root canals in 36 teeth in 34 patients with chronic apical periodontitis have been studied by microbiological examination. In root canals of patients with periodontitis the most often Lactobacterium spp. – 44 %, Enterococcus faecalis – 32 % and Enterobacterium spp. – 17 % were observed. Less common were Streptococcus spp. – 12 %, Candida albicans – 12 %, Peptostreptococcus spp. – 10 %, Corinebacterium spp. – 8 % and Actinobacterium – 7 %. The frequency of occurrence of other microorganisms did not exceed 2 %. It has been established that washing the root canals with saline solution, 1.25 % sodium hypochlorite solution, 2 % chlorhexidine solution, treatment with EDTA gel (in combination with sonication of irrigants with ultrasound) give a similar antiseptic effect at the stage of final medicinal treatment.

Key words: periodontitis, medicamental cleansing, dissemination.

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МІКРОБІОЛОГІЧНА ОЦІНКА МЕДИКАМЕНТОЗНОГО ОЧИЩЕННЯ КОРЕНЕВИХ КАНАЛІВ ПРИ ПАРОДОНТИТІ

Метою дослідження було оцінити ефективність заключного медикаментозного очищення кореневих каналів зубів при пародонтиті. Усього за допомогою мікробіологічного дослідження вивчено 58 кореневих каналів 36 зубів у 34 пацієнтів із хронічним апікальним періодонтитом. У кореневих каналах хворих на пародонтит найчастіше зустрічаються Lactobacterium spp. – 44 %, Enterococcus faecalis – 32 % та Enterobacterium spp. – спостерігалося 17 %. Рідше зустрічалися Streptococcus spp. – 12 %, Candida albicans – 12 %, Peptostreptococcus spp. – 10 %, Corinebacterium spp. – 8 % та актинобактерії – 7 %. Частота визначення інших мікроорганізмів не перевищувала 2 %. Встановлено, що промивання кореневих каналів фізіологічним розчином, 1,25 % розчином натрію гіпохлориту, 2 % розчином хлоргексидину, обробка гелем ЕДТА (у поєднанні з обробкою ультразвуком) дають аналогічний антисептичний ефект на етапі заключного медикаментозного лікування.

Ключові слова: пародонтит, медикаментозне очищення, дисемінація.

The outcome of periodontitis treatment depends on many factors: mechanical and medicinal treatment, hermetically sealed obturation of the apical and ostial parts, the tightness of the root filling to the canal walls, the extent of destruction, body resistance, anatomical features of the structure of the roots and the somatogenic status of the patient [1, 7, 8]. Moreover, each factor has its own characteristics and nuances in assessing its significance. It is believed that the final medicinal treatment of the root canal after its formation is the main step in achieving the “purity” of the canal [9].

According to some authors, to achieve this goal, the most effective is the use of 0.5–3.0 % sodium hypochlorite solution in a volume of 12–15 ml in combination with ethylenediaminetetraacetic acid (EDTA) by irrigation [11]. The other authors recommend using a sodium hypochlorite solution of higher concentration (up to 5 %) and in a larger volume (5–20 ml per 1 root canal), sounding it with ultrasound. In some works, were noted that there are no differences in the antibacterial effect of different concentrations of sodium hypochlorite (1 %, 3 %, 5 % solutions) in the treatment of periodontitis. Sodium hypochlorite is not effective enough against Enterococcus faecalis and Candida, which are often cultured from the root canal during periodontitis. Therefore, adding chlorhexidine for the medicinal treatment of the root canal was suggested by a number of studies [1, 5, 11].

While the understanding of the microbial complexity of root canal infections has substantially improved over the past decade. On the other hand, although the success rates of root canal treatments have been very favorable, they have not experienced the same extent of improvement [2, 4, 9].

Given such a large number of opinions and methods of final medicinal treatment of the root canal, our goal was to determine the effectiveness of various agents and their combinations at the stage of final medicinal treatment in the treatment of periodontitis.

Material and methods. Using a random sampling method, groups of patients with apical periodontitis who required endodontic treatment were formed. Depending on the selected medications and their combinations, 5 groups were conditionally identified. In all cases, mechanochemical treatment of the root canal was carried out using manual endodontic instruments with a 2 % taper using the Step Down and Step Back method with EDTA lubricant and irrigation with a 1.25 % sodium hypochlorite solution in a volume of 5 ml per canal. These methods of preparing the walls of the root canal were chosen due to the

fact that they are most common among doctors in state and municipal dental clinics in Baku. The stage of final medicinal treatment of the canal after its expansion was different in the study groups. In the first group, which included 10 patients and in whom 10 teeth were treated (9 single-rooted and 1 three-rooted tooth with diagnoses: "chronic fibrous periodontitis" – 4, "chronic granulating periodontitis" – 2, "exacerbation of chronic periodontitis" – 4). At the stage of final medicinal treatment, a 1.25 % solution of sodium hypochlorite in a volume of 10 ml was used, in a stream, from a syringe with an endodontic needle for each canal. 24 microbiological studies were carried out in this group.

In the second group, 5 patients during the treatment of 5 teeth (2 single-rooted and 3 three-rooted teeth with diagnoses: "chronic granulating periodontitis" – 1, "exacerbation of chronic periodontitis" – 4) at the stage of final medicinal treatment, each canal was irrigated with a 0.9 % chloride solution sodium in a volume of 10 ml. 22 microbiological studies were performed on these patients.

In the third group, 7 patients in the treatment of 7 teeth (3 single-rooted, 3 double-rooted and 1 triple-rooted teeth with diagnoses: "chronic granulating periodontitis" – 2, "exacerbation of chronic periodontitis" – 5) included in the final medicinal treatment a 2 % solution of chlorhexidine in a volume of 2 ml per channel, followed by irrigation with 0.9 % sodium chloride solution in a volume of 10 ml.

They carried out 24 microbiological studies. In the fourth group, in 7 patients, when treating 7 teeth (4 single-rooted, 3 three-rooted teeth with diagnoses: "chronic fibrous periodontitis" – 1, "chronic granulating periodontitis" – 3, "exacerbation of chronic periodontitis" – 3) at the stage of final medicinal treatment they used 1.25 % sodium hypochlorite solution and EDTA gel with ultrasound sonication, after which a 0.9 % sodium chloride solution was used in a volume of 10 ml. 26 microbiological studies were carried out on patients in this group. In the fifth group, 5 patients were treated with 7 teeth (4 single-rooted, 1 double-rooted and 2 three-rooted teeth with diagnoses: "chronic granulating periodontitis" – 2, "exacerbation of chronic periodontitis" – 5) without final medicinal treatment. In this group, 20 microbiological studies of dentin were carried out. Dentin for microbiological examination was taken from the canal walls with sawing movements using a sterile H-file twice: after creating access and initial examination of the root canal and after canal formation and final medicinal treatment. The COPAN system was used to transport the material. Within 48 hours, the collected material was delivered to the bacteriological laboratory.

The delivered material was cultured on Columbia Blood Agar Base supplemented with 5 % sterile blood.

Results of the study and their discussion. As a result of the study, 36 teeth with 58 root canals were treated in 34 patients aged 20 to 65 years. Of the treated teeth, in 21 cases the diagnosis was "exacerbation of chronic periodontitis", in 5 – "chronic fibrous periodontitis", in 10 – "chronic granulating periodontitis". Of the 36 treated teeth, 21 were single-rooted, 6 were double-rooted, and 9 were three-rooted. When treating two- and three-rooted teeth, the same method of final medicinal treatment was used in all canals. Initially, no microorganisms were detected in 10 channels out of 58 – 17.2 %. In 48 out of 58 canals, according to our data, during the first sampling of dentin, from 1 to 5 types of microorganisms were found (Table 1).

Table 1

Level of infection and species composition of microorganisms in root canals in patients with periodontitis before mechanochemical treatment

Type of microorganisms	Number of patients	Number of Root Channels	Frequency index	Contamination (points)
Lactobacterium spp.	17	26	0.44	2.7±0.1
Enterococcus faecalis	12	19	0.32	3.0±0.2
Enterobacter spp.	7	10	0.17	2.6±0.4
Corinebacterium spp.	4	5	0.08	1.8±0.3
Echerichia coli	2	2	0.03	3.0±0.0
Streptococcus spp.	6	7	0.12	2.3±0.4
Candida albicans	4	7	0.12	3.0±0.4
Peptostreptococcus spp.	5	6	0.10	2.3±0.4
Klebsiella pneumoniae	1	1	0.02	3.0±0.0
Morganelle morg.	1	1	0.02	3.0±0.0
Neisseria	1	1	0.02	1.0±0.0
Leptotrix	1	1	0.02	1.0±0.0
Actinobacterium	2	4	0.07	3.2±0.7
Staphylococcus epidermidis	1	1	0.02	1.0±0.0

The most often Lactobacterium spp. – 44 %, Enterococcus faecalis – 32 % and Enterobacterium spp. – 17 % were observed. Less common were Streptococcus spp. – 12 %, Candida albicans – 12 %, Peptostreptococcus spp. – 10 %, Corinebacterium spp. – 8 % and Actinobacterium – 7 %. The frequency of occurrence of other microorganisms did not exceed 2 %.

Analyzing the contamination of root canals in various forms of chronic apical periodontitis, it was revealed that as the course of the disease becomes more severe (from chronic fibrous periodontitis to exacerbation of chronic destructive periodontitis), the range of microbial landscape increases (from 5 species in chronic fibrous periodontitis to 12 – during exacerbation of chronic destructive periodontitis) and the frequency of inoculation of opportunistic and pathogenic microorganisms (Table 2).

Table 2

Infection of root canals in patients with various forms of chronic apical periodontitis

Diagnosis	Number of patients	Number of teeth	Number of root canals	Type of microorganisms	Frequency index	Contamination (points)
Chronic fibrous periodontitis	4	5	4	Lactobacterium spp.	0.57	3.0±0.7
			2	Enterococcus faecalis	0.28	2.5±1.25
			1	Corinebacterium spp.	0.14	2.0±0.0
			1	Echerichia coli	0.14	3.0±0.0
			1	Morganelle morg.	0.14	3.0±0.0
Chronic granulating periodontitis	10	10	7	Lactobacterium spp.	0.37	2.8±0.4
			3	Enterobacter spp.	0.16	2.0±0.6
			2	Corinebacterium spp.	0.11	2.0±1.0
			2	Streptococcus spp.	0.11	2.5±1.25
			1	Enterococcus faecalis	0.11	3.0±0.0
			1	Peptostreptococcus spp	0.05	2.0±0.0
			1	Leptotrix Candida	0.05	1.0±0.0
			1	albicans	0.05	3.0±0.0
Exacerbation of chronic periodontitis	20	21	7	Enterobacter spp.	0.22	2.8±0.4
			14	Lactobacterium spp.	0.44	2.7±0.2
			16	Enterococcus faecalis	0.50	3.1±0.2
			5	Streptococcus spp.	0.15	2.2±0.4
			5	Candida albicans	0.15	3.4±0.6
			5	Peptostreptococcus spp	0.15	2.4±0.4
			1	Klebsiella pneumoniae	0.03	3.0±0.0
			2	Corine bacterium spp.	0.06	1.5±0.7
			1	Neisseria	0.03	1.0±0.0
			4	Actinobacterium	0.12	3.2±0.8
			1	Echerichia coli	0.03	3.0±0.0
			1	Staphylococcus epid.	0.03	1.0±0.0

Microbiological contamination is rated from 1 to 4 points. In none of the channels was an infection level of up to 5 points noted; on average it was 2.3±0.1 points. Moreover, in the first group it was 2.4±0.4 points, in the second – 2.7±0.4 points (P 1–2>0.05), in the third – 2.1±0.4 points (P 1–3>0.05, P 2–3>0.05), in the fourth – 1.8±0.3 (P 1–4>0.05, P 2–4>0.05, P 3–4>0.05) and in the fifth – 2.7±0.4 points (P 1–5>0.05, P 2–5>0.05, P 3–5>0.05, P 4–5>0.05).

So, if during exacerbation of chronic periodontitis, Enterococcus faecalis (50 %), Lactobacterium spp. (44 %), Enterobacterium spp. (22 %), are found in a large percentage of cases. Then in chronic fibrous periodontitis with a high frequency of inoculation, only Lactobacterium spp. (57 %) and Enterococcus faecalis (28 %), and Candida albicans and Actinobacterium were not found at all (versus 15 % and 12 % in the first case).

It was established that the stage of final medicinal irrigation in 100 % of cases leads to the same time costs. Thus, the data we obtained made it possible to detect the physiological sterility of the canals in periodontitis in 17 % of cases. It was revealed that mechanochemical preparation reduces the infection of the walls of the main root canal by 5 times, although it does not lead to the complete elimination of microorganisms and the time costs turned out to be the same. Thus, the data we obtained made it possible to detect the physiological sterility of the canals in periodontitis in 17 % of cases. It was revealed that mechanochemical preparation reduces infection of the walls of the main root canal by 5 times, although it does not lead to the complete elimination of microorganisms from the dentin of the main root canal. We used final medicinal irrigation in patients of the first four groups, and only in the fifth group was this stage deliberately omitted. In all four groups out of five, no growth of microorganisms was obtained in dentin samples taken after the final drug treatment (P<0.02). And only in one fifth group the canal infection remained after mechanochemical treatment. However, although the final medicinal treatment stage was not carried out in the fifth group, the reduction in the contamination of the canals with microorganisms was significant and amounted to only 0.5±0.2 points versus 2.7±0.4 points (P<0.01). At the same time, Candida albicans, Enterococcus faecalis and Lactobacterium spp were sown. Consequently, the mechanochemical preparation of dentin itself significantly reduces the infection of the walls of the root canal by microorganisms, although it does not lead to their complete elimination. In addition, it was revealed that the types of final medicinal treatment of the root canal we used reduce the infection of dentin to the same extent. In other words, the final

result in both the group where only irrigation with saline solution was used for final treatment (second group), and in the groups where sodium hypochlorite was used (first group) or an additional solution of chlorhexidine was included (third group), or sonication of antiseptic solutions with ultrasound was carried out (fourth group), despite different material and time costs, turned out to be the same.

Periodontitis represents the main cause of dental emergency interventions, and its exacerbated forms may spread to nearby facial spaces further leading to severe, life-threatening complications [3].

The intricate root canal microbial flora is a significant concern in the failure of endodontic therapy. The success of root canal treatment is related to the decrease in the number of microbes. Based on the complex anatomy of the primary root canals, it is acknowledged that, with accessible instruments and techniques, reducing the microbial load to a status below that is necessary to initiate or persist the disease is adequate for the success of pulpectomy [5, 10].

Irrigation in pulpectomy procedure is not only essential to flush away the debris created during instrumentation, but also to act as a lubricant for instruments and to eliminate the smear layer that forms on dentine surfaces following instrumentation. We used for irrigation with a 0.9 % sodium chloride solution. But Byström and Sundqvist demonstrated more reduction in the bacterial count by using saline as an irrigant in permanent root canals [6].

Microbial reduction was significantly reduced in all the postinstrumentation samples, but none of the samples were rendered free of microbes. The rotary instrument reduced 93–96 % of aerobic and anaerobic microbes, whereas manual K and H files reduced 87–91 % of microbes [11]. In our study the main microbial agents during exacerbation of chronic periodontitis were Enterococcus faecalis (50 %), Lactobacterium spp. (44 %), Enterobacterium spp. (22 %), which were found in a large percentage of cases.

In one of the previous studies, Lakshmanan L, et al, with the purpose to comparatively evaluate the efficacy of Kedo-SG blue rotary files, manual K-files, and manual H-files in eliminating the root canal microflora of primary molars, observed 45 primary molars requiring pulpectomy. Results revealed that Kedo-SG blue rotary files showed a better reduction of microbes in root canals when compared to manual instrumentation. However, there was no significant difference between manual and rotary instrumentation in microbial reduction of primary root canals [6]. Despite of fact that in our work we used the different antiseptics, we also revealed that all our antimicrobial solutions had the similar antiseptic effect.

So, while the understanding of the microbial complexity of root canal infections has substantially improved over the past decade, the success rates of root canal treatments have been very favorable, which increases the importance of researches in this field [9, 10].

Conclusions

1. In root canals of patients with periodontitis the most often Lactobacterium spp. – 44 %, Enterococcus faecalis – 32 % and Enterobacterium spp. – 17 % were observed. Less common were Streptococcus spp. – 12 %, Candida albicans – 12 %, Peptostreptococcus spp. – 10 %, Corinebacterium spp. – 8 % and Actinobacterium – 7 %. The frequency of occurrence of other microorganisms did not exceed 2 %.

2. It has been established that washing the root canals with saline solution, 1.25 % sodium hypochlorite solution, 2 % chlorhexidine solution, treatment with EDTA gel (in combination with sonication of irrigants with ultrasound) give a similar antiseptic effect at the stage of final medicinal treatment.

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COMPLEX TREATMENT OF LOCALLY ADVANCED MALIGNANT TUMORS OF THE THYROID GLAND WITH INVASION INTO THE ORGANS OF THE NECK AND MEDIASTINUM

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Patients with locally advanced thyroid cancer require particular attention, as the selection of surgical techniques and a logical program of complex therapy for them remain controversial. Given the significant complexity and prevalence of fatal complications in cases of tumor stenosis of the upper airway during emergency tracheostomy, it is recommended that the patient be prepared for radical or palliative surgery in a prepared operating room in a planned manner with patient intubation, if possible. Given the high proportion of locally advanced, highly differentiated tumors that are refractory to radioiodine therapy and have a high malignant potential, as well as the poor prognosis associated with local recurrence of the disease, surgical intervention as part of a comprehensive treatment plan should be as radical and aggressive as possible, with macroscopic removal of the entire tumor, including all invasions of organs and tissues of the neck and mediastinum, especially in cases of medium and low-grade tumors. Conversely, when planning a traumatic surgery, it is essential to consider the patient's general condition, age, and comorbidities. In cases where traumatic surgery is contraindicated, particularly in highly differentiated cancers, less radical methods of "shaving" the tumor without compromising the integrity of the organ may be employed.

Key words: malignant thyroid tumors; surgical tactics, upper respiratory tract

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КОМПЛЕКСНЕ ЛІКУВАННЯ МІСЦЕВО-РОЗПОВСЮДЖЕНИХ ЗЛОЯКІСНИХ ПУХЛИН ЩИТОПОДІБНОЇ ЗАЛОЗИ З ІНВАЗІЄЮ У ОРГАНИ ШИЇ ТА СЕРЕДОСТІННЯ

Особливої уваги заслуговують пацієнти з місцево-розповсюдженими формами раку щитоподібної залози, питання вибору хірургічної тактики й раціональної програми комплексної терапії щодо яких натепер залишаються дискутабельними. Враховуючи велику складність та кількість літальних ускладнень у випадках пухлинних стенозів верхніх дихальних шляхів при проведенні ургентної трахеостомії, при можливості, ми рекомендуємо швидко підготувати пацієнта до радикального або паліативного хірургічного втручання у підготовленої операційної в плановому порядку з інтубацією пацієнта. Враховуючи велику частку місцево-розповсюджених високодиференційованих пухлин рефрактерних до радіойодтерапії з високим злоякісним потенціалом, гіркий прогноз у випадках локального рецидивування захворювання, хірургічне втручання у складі комплексного лікування повинно бути максимально радикальним та агресивним з макроскопічним видаленням усієї пухлини, включно усі інвазії органів й тканин шиї та середостіння, особливо у випадках середньо- та низькодиференційованих пухлин. З іншого боку, при плануванні травматичної операції, треба враховувати загальний стан, вік та супутні захворювання пацієнта. В випадках наявності протипоказань до травматичної операції, особливо при високодиференційованих раках, мають право на існування менш радикальні методики «збривання» пухлини без порушення цілісності органу.

Ключові слова: злоякісні пухлини щитоподібної залози; хірургічна тактика, верхні дихальні шляхи

The work is a fragment of the research project "Improvement of diagnostics and surgical treatment of pancreaticobiliary, peripheral vascular and thyroid pathology", state registration No. 0120U103031.

Thyroid cancer (TC) represents a relatively minor proportion of overall cancer morbidity, accounting for 0.4–2 % of all neoplastic tumors. However, it is regarded as a leading cause of malignant diseases of the endocrine system [8]. In over 90 % of cases, thyroid cancer is diagnosed in stages I–III, with highly differentiated, papillary, and follicular forms. These forms of thyroid cancer are relatively straightforward to treat and have a very good prognosis [7]. However, in recent years, the incidence of not only highly differentiated thyroid cancer but also the percentage of neglected thyroid malignancies with extrathyroidal spread of medium and low morphologic differentiation, including medullary, low-grade, anaplastic, and primary thyroid lymphomas, has been increasing rapidly [9].