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RATIONALE FOR CHRONIC PERIODONTITIS THERAPY USING PHOSPHATE BUFFER NANOCRYSTALS

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Technologies that combine an algorithm that includes instrumental interventions with the use of medications and root canal obstruction are widely used in endodontic treatment of complicated dental caries in Ukraine and Europe. The success of this therapy in some cases does not satisfy both dentists and their patients. The purpose of the study was establishing the effectiveness of treatment of patients with chronic periodontitis with the use of phosphate buffer nanocrystals in the period from 6 to 18 months. The analysis of clinical and radiological data on the recovery of periapical tissues during treatment of patients with chronic apical periodontitis showed that the regeneration of apical and adjacent periodontal areas had a positive dynamic in 91 % (20 patients) cases. The effectiveness of the developed method of treatment of these patients was confirmed by the results of clinical examinations and radiological methods of research. The different degree of contrast range of the above active zones of mineralization, in our opinion, indicates a different degree of presence of dentinal liquor in the tubules, which in their histological structure are more open towards the central canal of these zones. The anatomical apex of the root during the treatment period also acquired a characteristic clear shape, and its surface had sclerosed light and clear boundaries. The proposed method of treatment of chronic apical periodontitis on the basis of the results of treatment requires further study in the long-term follow-up of 2–5 years in order to be widely implemented in practical dentistry.

Key words: chronic apical periodontitis, periapical tissues, nanocrystals, treatment.

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ОБГРУНТУВАННЯ ТЕРАПІЇ ХРОНІЧНИХ ПЕРІОДОНТИТІВ З ВИКОРИСТАННЯМ НАНОКРИСТАЛІВ ФОСФАТНОГО БУФЕРА

В Україні та Європі при ендодонтичному лікуванні ускладненого карієсу використовують технології,що поєднують в собі алгоритм, який включає інструментальні втручання з використанням медикаментозних засобів та обтурацією кореневих каналів. Успішність цієї терапії в окремих випадках не задовольняють як лікарів- стоматологів так і їх пацієнтів. Метою роботи було обгрунтувати ефективність лікування пацієнтів з хронічними періодонтитами при застосуванні нанокристалів фосфатного буфера у терміни від 6 до18 місяців. Аналіз клінічних та рентгенологічних даних процесу відновлення періапікальних тканин під час лікування хворих на хронічний верхівковий періодонтит показав, що регенерація верхівкових та прилеглих до них ділянок періодонту в 91 % (20 пацієнтів) випадках мали позитивну динаміку. Ефективність розробленого методу лікування зазначених хворих підтвердили результати клінічних обстежень та рентгенологічні методи дослідження. Різна ступінь контрастності вище зазначених активних зон мінералізації, на нашу думку, вказує на різну ступінь присутності дентинного ліквору в канальцях, які по своїй гістологічній структурі більш відкриті в бік центрального каналу цих зон. Анатомічна верхівка кореня за період лікування також набула характерної чіткої форми, а її поверхня має склерозовані світлі та виразні межі. Запропонований спосіб лікування хронічного верхівкового періодонтиту на підставі отриманих результатів лікування потребує подальшого дослідження у віддалені терміни спостережень 2–5 років з метою широкого впровадження в практичну стоматологію.

Ключові слова: хронічний верхівковий періодонтит, періапікальні тканини, нанокристали, лікування.

The work is a fragment of the research project "Studying the influence of oral fluid and biofilm on the development of diseases of the oral cavity", state registration No. 0121U107494.

Technologies that combine an algorithm that includes instrumental interventions with the use of medications and root canal obstruction are widely used in endodontic treatment of complicated dental caries in Ukraine and Europe. The success of this therapy in some cases does not satisfy both dentists and their patients.

In such situations, the combined use of nanotechnology and treatment standards will accelerate the recovery of periodontal tissues [1-3]. Our proposed method of intracanal impregnation of microtubules of the apical root canal with phosphate buffer is relevant. According to the obtained preliminary results (30 days) of treatment, the effectiveness of the combined use of phosphate buffer nanocrystals was established. The latter reacts with phosphates to form a specific biologically inert crystalline substance of calcium phosphate (liquid crystal) [4, 5]. In fact, the developed nanosystem promotes the proliferation of the structures of the basic substance, which is impossible without the activation of cytological factors. This statement is reflected in the compaction and mineralization of bone tissue in general and adjacent areas [7, 9–11]. This result clinically indicates osteo-odontogenic tissue differentiation. Therefore, it is at the forefront of the possibility of controlled delivery of nanostructures into the area of pathological lesions,

which provides a significant opportunity for successful treatment of periodontal tissues [6–8]. The method of treatment is described in the declaratory patent of Ukraine №137648 as of 25.10.2019.

This prompted us to further study the results of treatment of patients with chronic periodontitis in the long term follow-up [5, 6].

The purpose of the study was to establish the effectiveness of treatment of patients with chronic periodontitis with the use of phosphate buffer nanocrystals in the period from 6 to 18 months.

Materials and methods. We examined and treated 22 patients aged 18 to 65 years with acute and chronic apical periodontitis. All patients were examined according to the protocols of diagnosis and treatment of this pathology. The additional examination included radiological validation before and after treatment, the duration of which was determined individually and depended on the dynamics of the inflammatory process, individual treatment according to the specific clinical case in the period from 6 to 18 months. X-ray evaluation was performed by visual inspection of target images under the magnifying glass, highlighting the dynamic changes in the periapical tissues. The method of treatment is described in the patent [6].

Results of the study and their discussion. The female patient complained of causal pain in the tooth of the lower right jaw. The complaints appeared a week ago after endodontic treatment of chronic periodontitis. On examination: the crown of tooth 44 was completely destroyed; a deep carious cavity, conjoined with the root canal, was noted on the masticatory surface. Tooth percussion was slightly painful, thermometry was negative. Mucous membrane in the projection of the apex of the root was of natural color, slightly painful on palpation. The target X-ray (fig. 1a) revealed the spongy bone tissue with pronounced shadow intensity without clear boundaries in the area of the root apex; the periodontal fissure was widened, according to the classification of S.A. Weindruch (1962). Based on the results of clinical and radiological studies, the diagnosis was made: exacerbation of chronic granulomatous periodontitis 44.

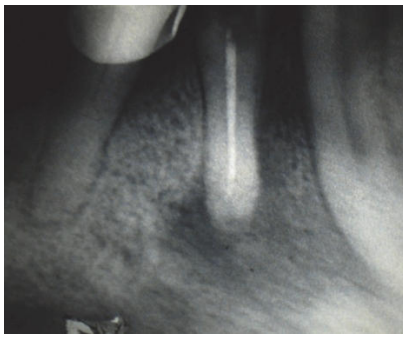

Fig. 1a. Target X-ray image of tooth 44 in the patient. The condition of the tooth before treatment.

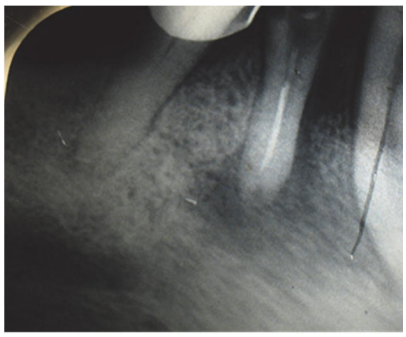

Fig. 1b. Target X-ray image of tooth 44 in the patient. The condition of the tooth within 6 months after treatment.

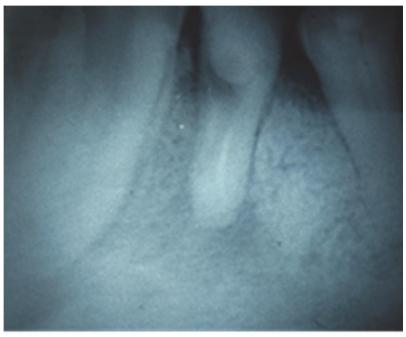

Fig. 1c. Target X-ray image of tooth 44 in the patient. The condition of the tooth within 12 months after treatment.

The patient was treated in two visits. At the first visit, the patient's root canal was unsealed; the apex of the root was opened for the outflow of exudate. At the end of treatment, the patient was given recommendations: mouth rinse with antiseptic for a week. At the second visit, there were no complaints, which allowed for a full course of treatment according to the method described above.

Following the six months after treatment, the patient had previous complaints of causal pain in the tooth of the lower right jaw. In this case, a positive reaction was observed clinically with vertical percussion of the causative tooth, hyperemia in the area of the projection of the root apex and painful palpation of the mucous membrane of this area.

Radiologically (fig. 1b), destructive processes of the root apex and bone tissue were observed and had a shadow of considerable intensity without clear boundaries. Further treatment was performed according to the above method.

6 months after repeated treatment of the patient (following a year after the first visit) no complaints appeared. Radiologically (fig. 1c), there was a complete absence of low-intensity shadow, which changed to the cleared area of the entire perimeter of the periodontium with clear boundaries. The width of the periodontal fissure significantly decreased compared to the previous visit. A significant degree of mineralization of the destructive area during the control period of observations was detected, which radiologically indicates the complete absence of the intensity of the shadow of this area. Due to the pronounced process of mineralization, delimitation of periodontal structures was partially conjoined with the characteristic elements of the periodontal hard tissues at the level of the spongy and lamellar bones of the alveolar process, which indicated a positive dynamics of treatment.

The other male patient complained of intermittent aching pain in the tooth of the lower right jaw. Complaints appeared a month ago. Previously, the tooth was treated for complicated dental caries. On examination: the crown of tooth 46 was partially destroyed; a deep carious cavity on the masticatory surface was noted, which passed to the proximal surface. The sounding revealed the orifice of the distal root canal; the orifices of the medial canals were sealed. Tooth percussion was slightly painful, thermometry was negative. The target X-ray image (fig. 2a) revealed curved shape of the area of the apex of the distal root, spongy bone tissue of the alveolar process without clear boundaries, widened periodontal fissure, radiological shadow of considerable intensity. Other areas of the periodontal fissure were also without clear boundaries, it was widened almost around the perimeter. The canals of the medial roots were completely sealed, periodontal tissues were intact. On the basis of the examination, the diagnosis was made: chronic granulomatous periodontitis 46. The patient was treated in one visit according to the method described above.

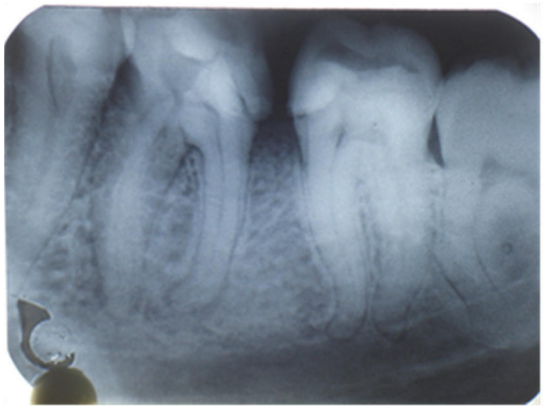

Fig. 2a. Target X-ray image of tooth 46 in the patient. The condition of the tooth before treatment.

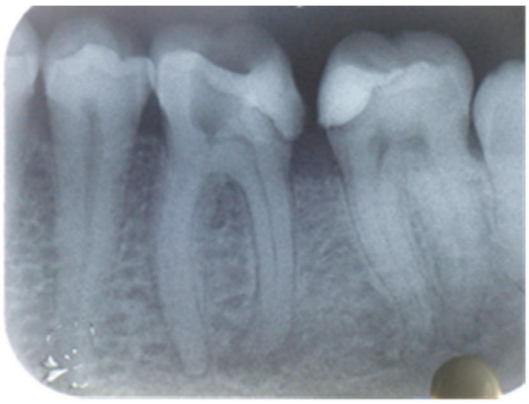

Fig. 2b. Target X-ray image of tooth 46 in the patient. The condition of the tooth within 9 months after treatment.

For the purpose of the long-term follow-up and assessment of the condition of periodontal tissues, the patient was made a repeated clinical examination and target X-ray image of the tooth 46.

Following 9 months after treatment, the patient had no complaints. On examination: in tooth 46 the filling met the clinical requirements, the gums were of normal color, and palpation in the area of the projection of the root apices and percussion of the tooth was painless. Radiologically (fig. 2b), significant compaction of the lower third of the distal root canal was noted. In the area of the apex of the distal root, a clear demarcation of the lesion was detected, the intensity of the shadow was absent with pronounced boundaries of the areas of enlightenment, which confirms the productive process of mineralization of the hard periodontal tissues. A periodontal fissure was within normal limits. It should be noted that, radiologically, the root canal of the root apex, due to obliteration, completely lost its shape within 9 months compared to the first visit. Therefore, the radiological contrast of the filling material of the upper third of the canal (or 2/3) can be restored with a suitable endodontic filling material.

Our latest clinical and radiological observations of long-term treatment outcomes date back one and a half years.

Another patient complained of intermittent aching pain in the lower jaw tooth. Complaints appeared a month ago, before the tooth was treated for dental caries. On examination: the crown of tooth 36 was partially destroyed, on the masticatory surface there was a deep carious cavity with remnants of filling material. The sounding revealed that the orifice of the distal root canal was opened; the orifices of the medial canals were sclerosed. Percussion in the distal canal was sensitive, thermometry was negative. The target X-ray image (fig. 3a) revealed that the canal of the distal root from the orifice to the apex had specific clear outlines. The spongy bone tissue of the apical part of the entry of the neurovascular bundle determined the pronounced intensity of the oval shadow without clear boundaries of 3–4 mm, the periodontal fissure was almost not widened. The canals of the medial roots were sclerosed. On the basis of the examination, the diagnosis was made: chronic granulomatous periodontitis 36. The patient was treated in one visit according to the method described above.

The results of the patient's treatment after 18 months showed no complaints. On examination: in tooth 36 the filling met the clinical requirements, the gums were of normal color, palpation in the area of the projection of the root apices and percussion of the tooth was painless. Radiologically (fig. 3b), significant compaction of the lower third of the distal root canal was noted. In the area of the apex of the distal root, there was a clear delimitation of the lesion, which was confirmed by the lack of shadow intensity. The periodontal fissure was within normal limits. The area of the missing neurovascular bundle was sclerosed and had clear oval boundaries of 3–5 mm.

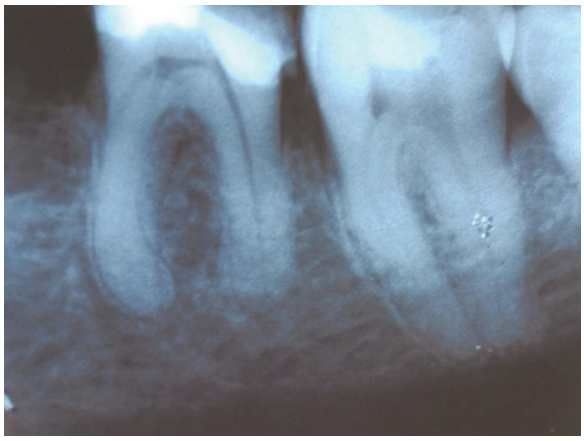

Fig. 3a. Target X-ray image of tooth 36 in the patient. The condition of the tooth before treatment.

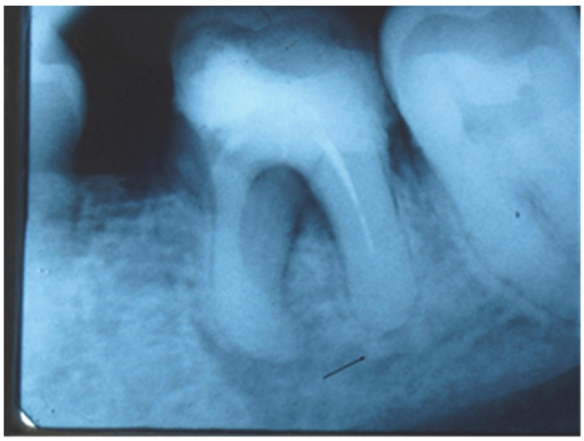

Рис. 3b. Target X-ray image of tooth 36 in the 45-year-old male patient L. The condition of the tooth within 18 months after treatment.

The results of treatment of 20 patients after 6, 9, 18 months confirmed the absence of complaints; clinically, the oral mucosa in the projection of the apices of the treated teeth was oa natural color, painless on palpation. Vertical percussion of tooth crowns was negative. Radiologically, in general, there was compaction of the periodontal fissure with clear boundaries and full obliteration of the apical part of single-rooted and multi-rooted teeth, which was confirmed by the absence of shadow intensity. However, in two patients with aggravated somatic status, no pronounced clinical dynamics was observed. The results of X-ray examination showed an insufficient process of mineralization of periodontal tissues and apical roots in the form of foci of different shadow intensity.

The outcomes of treatment in the long-term follow-up (6–18 months) showed, clinically and laboratory, elimination of inflammatory processes of periodontal tissues, as evidenced by the productive response of fibrous (collagen) and mineralized periodontal structures in radiological examination [4, 7]. Our results of treatment of patients with complicated dental caries after 18 months were positive in 91 % (20 patients), unchanged in 9 % (2 patients), which is consistent with the data of other researchers [9, 12].

Conclusion

The analysis of clinical and radiological data on the recovery of periapical tissues during treatment of patients with chronic apical periodontitis showed that the regeneration of apical and adjacent periodontal areas had positive dynamics in 91 % (20 patients) cases. The efficacy of the developed method of treatment of these patients was confirmed by the results of clinical examinations and radiological methods of research.

The different degree of contrast range of the above active zones of mineralization, in our opinion, indicates a different degree of presence of dentinal liquor in the tubules, which in their histological structure are more open towards the central canal of these zones. The anatomical apex of the root during the treatment period also acquired a characteristic clear shape, and its surface had sclerosed light and clear boundaries. The periodontal fissure was shortened and became lighter due to mineralization. Thus, the proposed method of treatment of chronic apical periodontitis on the basis of the results of treatment requires further study in the long-term follow-up of 2–5 years in order to be widely implemented in practical dentistry.

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THE ROLE AND PLACE OF LAPAROSCOPIC CHOLECYSTECTOMY IN PREGNANT WOMEN WITH A HISTORY OF COVID–19

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The purpose of the study was to determine the role and location of laparoscopic cholecystectomy in pregnant women with a history of COVID–19. 19 pregnant women underwent surgery. The mean age of pregnant women was 27±4.9 years. In the post-Covid period, clinical manifestations of the disease appeared in the first two days. Pregnant women who have had Covid-19 and patients with cholelithiasis and acute calculous cholecystitis have clinical manifestations of the disease in the form of hemolysed blood in the abdominal cavity and vesicular rashes on the visceral and parietal peritoneum, which sometimes merged into conglomerates and bled on contact. Pathomorphologically, the changes in the gallbladder wall were phlegmonous or gangrenous in nature. Diagnosis of this pathology in pregnant women who have had COVID–19 should be rapid and accurate. Cholecystectomy should be performed before developing complications of gallstone disease and acute calculous cholecystitis. In the postpartum period in pregnant women, laparoscopic cholecystectomy should become the "gold standard" of surgical treatment.

Key words: gallstone disease, calculous cholecystitis in pregnant women, postpartum period, cholecystectomy, laparoscopy.

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РОЛЬ І МІСЦЕ ЛАПАРОСКОПІЧНОЇ ХОЛЕЦИСТЕКТОМІЇ У ВАГІТНИХ, ЯКІ ПЕРЕХВОРІЛИ НА COVID–19

Метою дослідження було визначення ролі і місця лапароскопічної холецистектомії у вагітних, які перенесли COVID–19. Прооперовано 19 вагітних. Середній вік вагітних склав 27±4,9 років. У постковідному періоді клінічні прояви захворювання проявлялися у перші дві доби. У вагітних, що перенесли Covid–19, та хворих на жовчнокам'яну хворобу і гострий калькульозний холецистит, є клінічні прояви хвороби у вигляді гемолізованої крові у черевній порожнині та везикулярних висипань на вісцеральній і парієтальній очеревині, які місцями зливались у конгломерати і при контакті кровоточили. Патоморфологічно зміни у стінці жовчного міхура мали флегмонозний або гангренозний характер. Діагностика цієї патології у вагітних, які перенесли COVID–19, повинна бути швидкою і точною. Холецистектомію слід виконувати ще до розвитку ускладнень з боку жовчнокам'яної хвороби та гострого калькульозного холециститу. В післяковідному періоді у вагітних саме лапароскопічна холецистектомія повинна стати «золотим стандартом» оперативного лікування.

Ключові слова: жовчнокам'яна хвороба, калькульозний холецистит у вагітних, постковідний період, холецистектомія, лапароскопія.

The article is a fragment of the research project "Development and implementation of new methods of minimally invasive and endovascular interventions in metabolic syndrome, endocrine pathology, diseases of the lungs, oesophagus, liver and extrahepatic ducts, stomach, pancreas, colon and rectum, blood vessels", state registration no. 0119U003573.

The epidemic of coronavirus infection is accompanied by the emergence of new strains and the defeat of new segments of the population, starting from infants. Pregnant women deserve special attention [4, 9].

Gallstone disease (GSD) with acute calculous cholecystitis (ACC) clinical manifestations is diagnosed in 10–15 % of the human population [1]. According to the literature, GSD is by 2.5 times more common in women than in men [7, 8]. Exacerbation of the chronic process in the biliary system or acute