

Effectiveness of Preventive Measures in the Inactive Course of Chronic Parenchymatic Mumps in Children

Skuteczność działań profilaktycznych w nieaktywnym przebiegu przewlekłej świnki miąższowej u dzieci

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SUMMARY

Aim: To study the effectiveness of preventive measures in the inactive course of chronic parenchymal mumps in remission.

Materials and Methods: In the dynamics of precautionary measures, aimed at preventing of exacerbation of chronic processes in the parotid glands, were examined 29 children aged from 2 months to 16 years with inactive mumps in remission and 10 control persons aged from 7 to 15 years.

Results: According to the assessment of the cellular composition of parotid secretion before anti-relapse measures in 9 patients out of 19, it was possible to detect the presence of latent chronic inflammation in symmetrical glands in the absence of classical clinical symptoms and clear secretion. After the completion of the treatment-and-prophylactic complex, the number of inflammatory cells and the degree of its contamination with microorganisms decreased significantly.

Conclusions: The study of the composition of parotid secretion with taking into account of the results of ultrasound examination and sialography in the dynamic monitoring of chronic parenchymal mumps indicate its high diagnostic informativeness and allows a rational approach to planning preventive measures. The methodological approach, which was developed and tested by us and which was used in the active course of mumps, showed its high efficiency and inactive form of the disease, for the first year of observation the number of exacerbations decreased by 10 times, and for 5 years term- by 16 times, which allowed to prolong the remission period and improve the rheological properties of parotid secretion.

Key words: children, chronic parenchymal mumps, prevention of exacerbations

Słowa kluczowe: dzieci, przewlekła świnka miąższowa, profilaktyka zaostrzeń

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INTRODUCTION

Large salivary glands are secretory-excretory structures that perform important and diverse functions, affect the general condition of the body, the activity of the digestive system and endocrine status. Age-related anatomical and physiological features of the child's body determine the need to study their morphological structure, clinical manifestations in various nosological forms of the pathological process directly in the salivary glands, and reactive changes in them in various diseases of the maxillofacial area and other anatomical localization. Usually, most often it is a chronic recurrent mumps, which occupies a leading position among all chronic forms of sialadenitis in children [1-4].

The variety and polymorphism of clinical manifestations of mumps often leads to errors at all stages of diagnosis.

Therefore, a clear understanding of the characteristic symptoms, features of the disease and glandular function, changes in the amount of parotid secretion, its cellular composition, physicochemical and biochemical properties, the presence of organic disorders in the structural elements of the gland becomes important for correct diagnosis. It is possible to unify the diagnostic algorithm due to the introduction into clinical practice of modern technologies and their use as special, highly informative research methods in the early stages of the survey [5-8].

Due to the controversial issue of the role of a variety of exogenous and endogenous etiological factors involved in the formation of chronic inflammation, the signs of which can be present in the initial clinical manifestations of mumps, this controversy remains far from resolved. Identification

of numerous pathogenetic mechanisms involved in the exacerbation of the pathological process and maintenance of conditions to promote long-term remission, allows to determine the scope of treatment of both symptomatic and pathogenetic direction in all periods of chronic parenchymal mumps [9-11].

Despite the encouraging results obtained recently in the study of individual components of the pathogenesis of mumps, it is not always possible to timely predict the likelihood of exacerbation of disease or determine the duration of the stable remission phase of it. Moreover, the tactical approach to address these issues largely depends on the activity of the inflammatory process in the parotid gland, which determines the severity of functional and organic disorders at both local and general levels [12-14]. Early diagnosis plays a particularly important role in the effectiveness of treatment and prevention measures, which prevents significant progression of morphological changes in the future in the structural elements of the parenchyma and duct system, which determines the relevance of our work.

AIM

To study the effectiveness of preventive measures in the inactive course of chronic parenchymal mumps in remission.

MATERIALS AND METHODS

Scientific work was performed by summarizing of the results of 5 years' experience of anti-relapse measures in 29 children with inactive chronic parenchymal mumps, who are registered in the municipal enterprise "Children's City Clinical Dental Clinic of Poltava City Council", which is also the basic medical institution for the Department of Pediatric Surgical Dentistry. The age of patients ranged from 2 months to 16 years, and the control group consisted of 10 practically healthy individuals of primary and secondary school age (7-15 years). According to the International Classification of Diseases to Dentistry and Stomatology, based on the content of ICD-10, this disease is classified as Class 11 (K11).

At the first request for medical care for the diagnosis of recurrent mumps, general methods were used: survey, anamnesis of life and disease, palpation examination. Particular attention was paid to heredity, the nature of pregnancy and child development in the postnatal period, the presence of concomitant somatic diseases and clarified the cause that could provoke clinical manifestations of chronic pathological processes in the parotid glands.

Patients were also probed with the main excretory duct, visually determining the amount and nature of parotid secretion from which smears were made for further study of their cell composition after Romanowski-Giemsa staining. In order to detect structural changes in the anatomical structures of the salivary glands, ultrasound and sialography were performed in direct and lateral projections after the introduction of 76% solution of triombast into the duct system. The parenchyma of the gland was fine-grained and had a homogeneous structure and a capsule of normal thickness in children of the control group.

To confirm the role of some strains of microorganisms in maintaining the periodic manifestation of the inflammatory process, their species affiliation and quantitative parameters were determined in accordance with the order of the Ministry of Health of Ukraine №236 from 04.04.2012 and recommendations of the European Association for Clinical Microbiology and Infectious Diseases.

Taking into account the final effectiveness of treatment and prevention measures was carried out on the basis of comparing the results of clinical and special research methods obtained in dynamic observation. Statistical processing of digital material was carried out.

RESULTS

Previous publications have highlighted issues related to the specifics of the effectiveness of anti-relapse measures in the remission phase in the active course of chronic parenchymal mumps in children. The conducted studies clearly showed the high diagnostic informativeness of the study of the cellular composition of parotid secretion in the dynamics of observation, ultrasound diagnosis and sialography. The implementation of a prophylactic complex aimed at preventing exacerbations has significantly reduced the amount of exacerbations and the severity of inflammatory reactions in the parotid salivary gland and achieve longer remission period [14].

Encouraging results from previous studies have prompted us to continue working in this direction, but this has already applied to patients with inactive form of disease. To achieve this goal, a group of 29 patients was formed, who a month after treatment of the next exacerbation underwent an in-depth double examination - at the beginning and after the end of preventive measures. Bilateral parotid glands lesions with clinical manifestations were observed in 10 children (34.5%), and unilateral lesion were observed in 19 children (65.5%).

At the initial period, patients or their relatives had no complaints, but all patients experienced a salty taste in the mouth, especially before eating. Examination of patients did not reveal any visual changes, meanwhile, palpation revealed small foci of compaction within the anatomical location of individual lobes of the gland in 11 cases (37.9%). Enlargement of regional lymph nodes was found only in 9 children (31.0%). The oral mucosa was pale pink and well moisturized, and at the mouth of the duct of the gland there was a slight swelling and redness of the mucosa in 15 patients (51.7%) and in 11 cases (37.9%) there was a gaping duct. When massaging the parotid glands after dilatation of the duct with a salivary tube was obtained parotid secretion of sufficient quantity and normal viscosity in 7 children (21.1%), and in another 22 (75.9%) - the secretion was viscous and had single small whitish crumbs inclusion.

In the study of cell composition in cytograms of parotid secretion, which had whitish inclusions and was taken during the initial examination, in all 22 patients on a low-density protein substrate found a moderate number of scattered leukocytes, single lymphocytes, macrophages and coccal microflora (Figure 1).

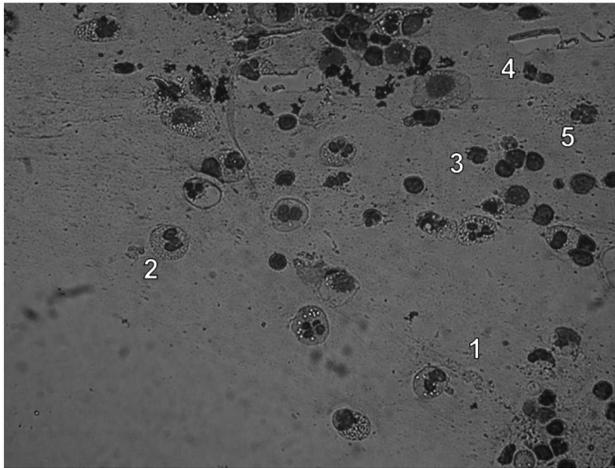


Figure 1. Micrograph of a smear of mumps secretion. On the background of low density protein substrate (1) a moderate number of destroyed forms of leukocytes (2), lymphocytes (3), single macrophages (4) and coccal microflora (5) is determined

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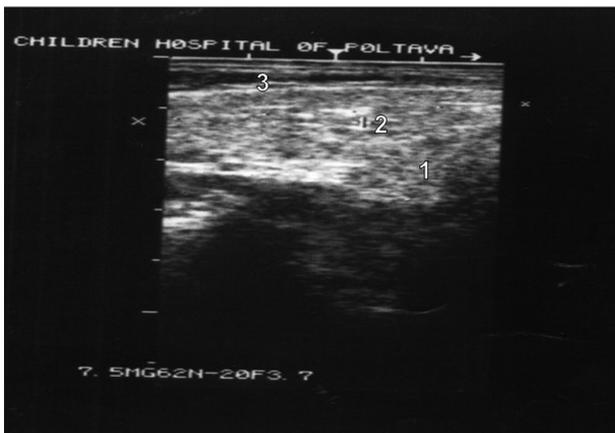


Figure 2. A small number of small, scattered dialectases (1), compaction of parenchymal tissues around them (2) and capsule compaction (3) are determined

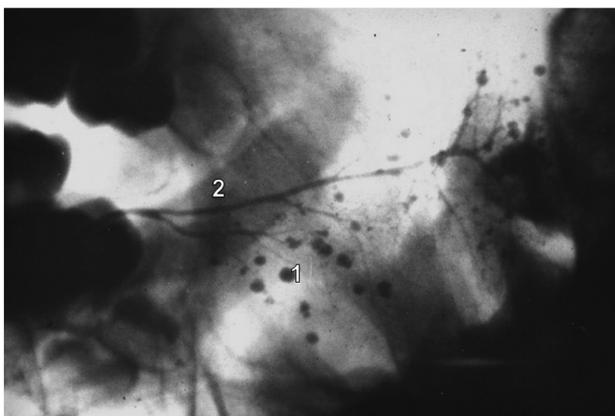


Figure 3. Sialogram of the left parotid gland in lateral projection. In some lobes of the gland, single small sialectases (1) and a slight expansion of the main excretory duct (2) are detected

During the study of the results of ultrasound diagnostics in all cases the compaction of the gland capsule was observed, and the parenchyma looked heterogeneous due to the alternation of single hypoechoic and echo-compacted areas (Figure 2). A few scattered, small sialectases were discovered on sialograms (Figure 3).

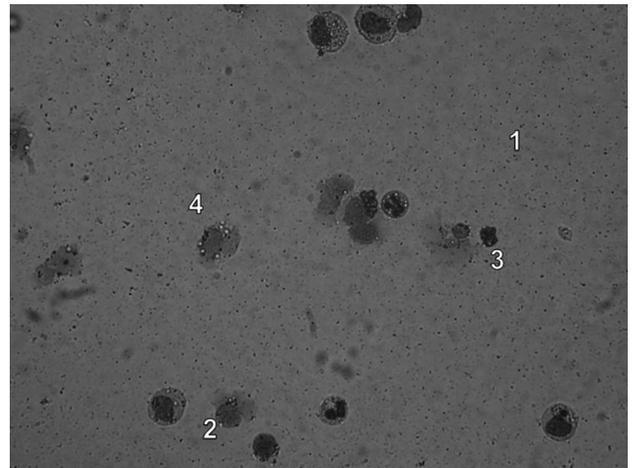


Figure 4. Micrograph of a smear of mumps secretion. On the background of mucus cells (1) a few, partially destroyed neutrophils (2), lymphocytes (3) and coccal microflora (4) is determined

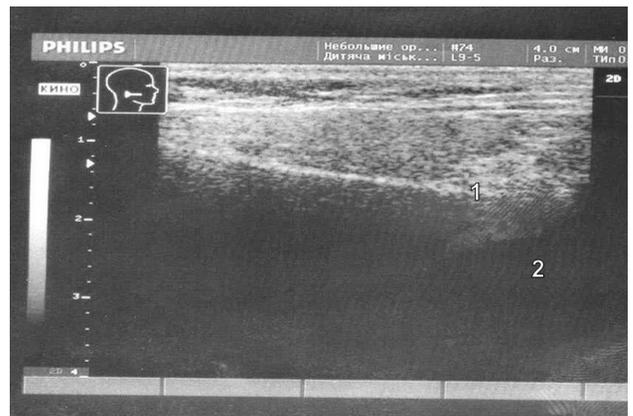


Figure 5. Ultrasound image of the right parotid gland. The image shows a single small sialectases (1) and compaction of parenchymal tissues (2)

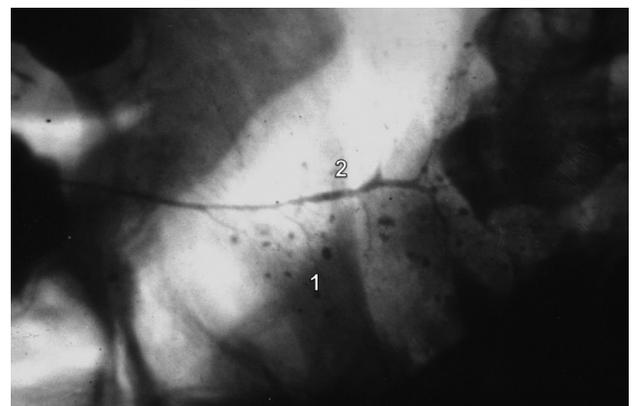


Figure 6. Sialogram of the right parotid gland in lateral projection. In the parenchyma, single small sialectases (1) and uneven contours of the main duct (2) detected

In 9 (47.3%) of 19 patients who did not have clinical manifestations of the disease in symmetrical glands, and their secretion was visually transparent, cytological examination of smears revealed the presence of a small number of inflammatory cells (Figure 4). The performed ultrasound examination revealed single, small and medium-sized sialectases in some lobes of the gland, around which the echo-dense parenchyma was visualized (Figure 5), and the presence of single small sialectases was found on sialograms (Figure 6).

Microbiological examination of 41 portions of parotid secretion, which was obtained from glands involved in chronic inflammation, revealed representatives of the coccal microflora in the amount from $5 \cdot 10^4$ to $5 \cdot 10^5$ per 1 ml of substrate. Streptococcal vegetation was determined in the analysis of secretion smears: in 8 cases (19.5%) hemolytic, and in 28 (68.3%) non-hemolytic and in 5 cases (12.2%) bacterial growth was not determined.

Given the fact that the proposed amount of treatment and prevention measures used in the treatment of active mumps showed good results, we tested its effectiveness in inactive form of disease.

At the time of completion of the prevention course, children and their relatives had no complaints. Visual examination of the face was symmetrical, and palpation revealed small single compacted areas of the parotid gland only in 3 children (10.3%). The oral mucosa was well moisturized in all children, edema around the mouth of the excretory duct was not found, and ductal yawning was observed in only 5 children (17.2%) with bilateral pathological process. After massaging of the parotid glands, in 21 children (72.4%) were received a clear secretion of normal viscosity, and only in 8 cases (27.6%) secretion had a slightly increased viscosity and included single small whitish flaky inclusions.

During the study of the cell composition of cytograms, it was found that in all patients whose secretions contained inclusions, and in 7 children (24.1%) whose secretions did not include inclusions, there was a low background field density and the presence of single, distinct destructive forms of neutrophils.

At the end of the treatment and prevention course, bacterial inclusions were isolated only from the parotid secretion of 23 glands, which is in 1.6 times less than in the first examination. Quantitative parameters of certain microorganisms in these smears has no significant differences in comparison with baseline level.

During the first year, with this approach to this category of patients, the number of exacerbations decreased by 10 times and in 5 years term - by 16 times. All children showed an improvement in the functional activity of the parotid salivary glands, and periodic exacerbations occurred with less pronounced clinical manifestations.

DISCUSSION

Chronic parenchymal mumps is a leader in all nosological forms of chronic sialadenitis, and it is characterized by a long course of the disease and frequent exacerbations, and therefore it requires significant efforts of doctors, material

resources and financial costs. For the correct establishment or confirmation of the clinical diagnosis, in addition to general methods of examination, special methods are widely used, including the study of the cellular composition of glandular secretions, ultrasound, sialography, conventional radiography. These measures allow for a detailed differential diagnosis, but their informativeness in the literature is still debated, because their importance depends on degree of the activity of the disease [5, 6, 11]. In particular, the study of the cellular composition of parotid secretion, which provides comprehensive information about the severity of the inflammatory process in the dynamics of observation and allows you to monitor the results of treatment, is not often used, especially during the period of remission [14]. In our opinion, it is necessary to use this method of examination more widely in everyday clinical practice in order to make a differential diagnosis of diseases of the large salivary glands of inflammatory nature, specific and nonspecific diseases of soft tissues of the maxillofacial area located in this anatomical area. The results of our work testify of the high informativeness of cytological examination of the cellular composition of parotid secretion, ultrasound examination and X-ray with artificial contrast of the structural elements of the parotid salivary glands. Recent methods allow to obtain high-quality images of both the duct system and parenchyma and to establish the severity of their organic disorders, which may be the key to forming a more targeted pathogenetic effect on the pathological process, determining the type and scope of treatment, which we recorded [6,14].

CONCLUSIONS

Evaluation of the effectiveness of a set of treatment and prevention measures in children with chronic parenchymal mumps should be based on the generalization of dynamic changes in the cellular composition of parotid secretion and its microbiological contamination. The severity of structural disorders in the anatomical components can be successfully established on the basis of ultrasound and sialographic picture. Planning and standardization of the treatment process should be based on functional criteria and structural disorders both in the duct system of the glands and directly in the parenchyma. With this methodological approach for the first year of observation the number of exacerbations decreased by 10 times, and for 5 years term - by 16 times, which is more pronounced than in the active course of the disease. It would be important to develop indications and contraindications to the use of more modern methods of examination, such as magnetic resonance imaging, sialography and endoscopy in order to detail the severity of duct deformities of various orders.

References

1. Heran BS, Chen JM, Ebrahim S et al. Exercise-based cardiac rehabilitation for coronary heart disease. *Cochrane Database Syst Rev.* 2011 Jul 6;(7):CD001800. doi: 10.1002/14651858.CD001800.pub2. Update in: *Cochrane Database Syst Rev.* 2016;1:CD001800.

2. Nowbar AN, Gitto M, Howard JP et al. Mortality From Ischemic Heart Disease. *Circ Cardiovasc Qual Outcomes*. 2019 Jun;12(6):e005375. doi: 10.1161/CIRCOUTCOMES.118.005375. Epub 2019 Jun 4.
3. Dong Y, Chen H, Gao J et al. Molecular machinery and interplay of apoptosis and autophagy in coronary heart disease. *J Mol Cell Cardiol*. 2019 Nov;136:27-41. doi: 10.1016/j.yjmcc.2019.09.001. Epub 2019 Sep 7.
4. Musunuru K, Kathiresan S. Genetics of Common, Complex Coronary Artery Disease. *Cell*. 2019;177(1):132-145. doi: 10.1016/j.cell.2019.02.015.
5. Garatti A, Castelveccchio S, Canziani A et al. CABG in patients with left ventricular dysfunction: indications, techniques and outcomes. *Indian J Thorac Cardiovasc Surg*. 2018;34(3):279-286. doi: 10.1007/s12055-018-0738-8. Epub 2018 Oct 17.
6. Lemma M, Atanasiou T, Contino M. Minimally invasive cardiac surgery-coronary artery bypass graft. *Multimed Man Cardiothorac Surg*. 2013;2013:mmt007. doi: 10.1093/mmcts/mmt007.
7. Anderson L, Thompson DR, Oldridge N et al. Exercise-based cardiac rehabilitation for coronary heart disease. *Cochrane Database Syst Rev*. 2016;5(1):CD001800. doi: 10.1002/14651858.CD001800.pub3. Update in: *Cochrane Database Syst Rev*. 2021 Nov 6;11:CD001800.
8. Richards SH, Anderson L, Jenkinson CE Psychological interventions for coronary heart disease. *Cochrane Database Syst Rev*. 2017;4(4):CD002902. doi: 10.1002/14651858.CD002902.pub4.
9. Knuth A, Ross-Stewart L, Brent C et al. Psychological Aspects of Rehabilitation as Perceived by Physical Therapists. *J Phy Fit Treatment & Sports*. 2018;2(1):555579. DOI: 10.19080/JPFMTS.2018.02.555579
10. Højskov IE, Moons P, Egerd I et al. Early physical and psycho-educational rehabilitation in patients with coronary artery bypass grafting: A randomized controlled trial. *J Rehabil Med*. 2019;51(2):136-143. doi: 10.2340/16501977-2499.
11. Wahba A, Milojevic M, Boer C et al. EACTS/EACTA/EBCP Committee Reviewers. 2019 EACTS/EACTA/EBCP guidelines on cardiopulmonary bypass in adult cardiac surgery. *Eur J Cardiothorac Surg*. 2020;57(2):210-251. doi: 10.1093/ejcts/ezz267.
12. Fushtej IM, Lashkul ZV, Kacuba JV. Osoblyvosti vedennja hvoryh pislja aorto-koronarnogo shuntuvannja u rannjomu ta piznjomu pisljaoperacijnomu periodi [Features of management of patients after coronary artery bypass grafting in the early and late postoperative period]. *Liky Ukrainy*. 2008;9:125-126. (UA)
13. Mischenko TS, Mischenko VM, Zdesenko IV et al. Faktory ryzyku rozvytku cerebrovaskularnyh porushen u hvoryh pislja kardiohirgichnyh vtruchan [Risk factors for the development of cerebrovascular disorders in patients after cardiac surgery]. *Ukrainskij visnyk psychonevrologii*. 2020;3(104):16-20. (UA)
14. Sousa-Uva M, Head SJ, Milojevic M et al. 2017 EACTS Guidelines on perioperative medication in adult cardiac surgery. *Eur J Cardiothorac Surg*. 2018;53(1):5-33. doi: 10.1093/ejcts/ezx314.
15. Sessler CN, Gosnell MS, Grap MJ et al. The Richmond Agitation-Sedation Scale: validity and reliability in adult intensive care unit patients. *Am J Respir Crit Care Med*. 2002;166(10):1338-44. doi: 10.1164/rccm.2107138.
16. Markham T, Wegner R, Hernandez N et al. Assessment of a multimodal analgesia protocol to allow the implementation of enhanced recovery after cardiac surgery: Retrospective analysis of patient outcomes. *J Clin Anesth*. 2019;54:76-80. doi: 10.1016/j.jclinane.2018.10.035. Epub 2018 Nov 6.

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A – Research concept and design, B – Collection and/or assembly of data, C – Data analysis and interpretation, D – Writing the article, E – Critical revision of the article, F – Final approval of article



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