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INFORMATIVENESS OF ULTRASONOGRAPHY AND SIALODENOGRAPHY IN ACTIVE CLINICAL COURSE OF CHRONIC PARENCHYMATOUS PAROTITIS IN CHILDREN

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Abstract

A total of 48 children aged between 3 and 15 years with this nosological form of disease have been examined. The analysis of the examination results of all patients has established that 21 children (43.8%), subsequently involved in the advanced scientific investigation, experienced the active course of the disease, and the frequency of exacerbations was between 3 and 9 times a year. The scope of researches included both common clinical methods of examination and specific ones. Sialodenography with artificial contrast study of the duct system using 76% Triombrastum has been carried out for the final determination of the degree of violation of the anatomical structure of the gland.

In all cases, ultrasonography showed a somewhat scirrhous capsule of the gland as well as sialectasis in varying amount and different sizes.

At the same time, the X-ray showed the presence of sialectasis of 2-4 mm in diameter in the gland parenchyma in 28.6%. Some of them experienced a deformation of the main excretory duct and I-III type ducts. The diffuse localization of multiple cavities from 1 to 2 mm has been found in 28.6% of children; however, smaller ducts have not been detected. In 23.8% of cases, it was possible to found a heterogeneous arrangement of sialectasis in all segments of the gland with insignificant dilatation of the duct system. In 19% of observations sialodenography revealed moderate number of sialectasis from 1 to 3 mm in gland parenchyma, and the main duct was relatively clear-margined, whereas smaller ones failed to be detected.

Thus, ultrasound diagnostics in chronic parenchymatous parotitis can be used in exacerbation of the disease as a confirming preliminary test to detect only the presence of sialectasis. Sialodenography is more informative, which makes it more likely to establish the expression of anatomical disorders in the structures of the gland.

Keywords: *children, parotid gland, chronic parenchymatous parotitis, diagnostics.*

Introduction

According to the domestic and foreign research data of recent decades, there has been an increase in the acute and chronic inflammatory diseases of greater salivary glands. Chronic parenchymatous parotitis takes the leading place in its structure, accounting for 87.6% of all chronic forms of sialoadenitis. The disease is characterized by frequent recurrences, its treatment is difficult due to its etiology and some pathogenetic mechanisms remain to be clarified and, even during the onset of the exacerbation of the disease changes in glands specific to chronic process are identified [*Tkachenko P, 1998; Moskalenko G, Dyakova S, 2001; Tkachenko P et al., 2013; 2014; 2016a*].

Classical forms of chronic parenchymatous parotitis are identified by the phases of its clinical course. In the exacerbation period, children have complaints on worsening of the overall health, loss of appetite, fatigue, and elevated body temperature, presence of swelling of the soft tissues in the area of the parotid gland, a slight dry mouth and a sense of saltiness of the oral fluid. In the vast majority of the patients skin over the swelling is without change; however, during the active clinical course the patients, admitted for

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the first time, can experience a slight hyperemia with collateral edema [*Tkachenko P, 1998; Moskalenko G, Dyakova S, 2001; Deryabin Ye, Shumikhina L, 2006; Tkachenko P et al., 2013; 2016b*].

Notwithstanding the large number of current methods of examination, the diagnosis of chronic diseases of salivary glands is impeded. In most cases the primary diagnosis made at the hospital is erroneous. This is due to the peculiarities of topographic-anatomical localization and the possibility of frequent affection by pathological processes of noninflammatory origin and sometimes a specific nature of the diseases. In addition, clinical manifestations of exacerbation are very similar to the clinical manifestations of epidemic parotitis and the acute parotitis of nonepidemic nature [*Gavryliyev V, 2012; Tkachenko P et al., 2013*].

In most cases, in clinical practice it is the cellular composition of the parotid secretion that should be examined to differentiate the diagnosis, determine the nosological form of the disease, evaluate the dynamics of the pathological process and estimate the effectiveness of treatment [*Tkachenko P, 1998*].

It is considered that the expression of the clinical manifestations of exacerbation is directly connected with the disorders in the anatomical structure of the gland, phagocytic activity of neutrophils which are in the secreta of parotid glands. Particularly, the emphasis is on reducing their phagocytic activity and phagocyte index. In turn, microbial antigens have the complementary ability to cause elevated chemotaxis of white blood cells. Moreover, the apparent lack of phagocytic activity in children is accompanied by the incomplete phagocytosis [*Tkachenko P, 1998; Tkachenko P et al., 2014; Tkachenko P, Popelo Yu, 2016*].

Currently, general clinical and specific methods of examination are widely used in every-day clinical practice to determine the nosological form of disease, evaluate the dynamics of the pathological process and estimate the effectiveness of treatment, which, however, do not always provide with comprehensive information [*Moskalenko G, 2006; Zengel P et al., 2011; Tkachenko P et al., 2014b*].

The purpose of this article was to study diagnostic efficacy of application of parotid glands ultrasonography and sialodenography in active clinical course of chronic parenchymatous parotitis in children.

Material and methods

Totally 48 children (25 boys and 23 girls) with chronic parenchymatous parotitis aged from 3 to 5 years have been examined and treated.

According to the clinical manifestations of chronic parenchymatous parotitis, the patients have been assigned into two groups. The first group (active clinical course) involved patients who, during the exacerbation of the chronic process in the parotid gland, experienced worsened overall health, significant inflammatory reactions, and the frequency of exacerbations was 3 to 9 times a year. The second group (inactive clinical course) included children who experienced exacerbations without prominent inflammatory response from the parotid glands and deterioration of the overall health, and the number of cases were 1-2 times a year.

The analysis of the examination results of all patients with exacerbation of chronic parenchymatous parotitis revealed that 21 children (43.8%) experienced active clinical course of the disease, and inactive clinical course was in 27 patients (56.2%). The bilateral affection of the parotid glands was diagnosed in 32 children (66.7%), and unilateral one was registered in 16 (33.3%). Cytological study of the secreta of symmetrical glands revealed latent course of chronic parotitis in 11 children (45.8%) out of 24 patients, who were admitted with unilateral manifestations of the disease that was subsequently confirmed by the ultrasound study and sialodenography.

Later on, we included only 21 children with active course of the process, which was the basis for writing the present article.

The scope of investigations included: general clinical methods of examination (past history, illness, examination, palpation, complete blood count and urine analysis) and specific ones (cytological study of the parotid secretion, ultrasonography of the parotides and sialodenography) [*Tkachenko P, 1998*].

For objective assessment of the results of diag-

nostic activities during the initial visit in the period of exacerbation of chronic parenchymatous parotitis a cytological study of the secreta has been carried out according to the conventional technique, determining the qualitative and quantitative parameters of cytograms [*Tkachenko P, 1998*].

Diagnostic ultrasonography of parotid glands was performed for all children using the "ULTIMA PA" (Radmir, Ukraine) apparatus with linear sensor in real time mode when the patient was admitted with exacerbation. In addition, the analysis of the echotexture of glandular tissue has been carried out in 10 children of the control group, where homogeneous fine-grained structure was detected in all parts of the gland, and the capsule was projected as a thin echo-dense line (Fig. 1).

Sialodenography with contrast study of the duct system using 76% Triombrastum has been carried out for all 21 patients with active clinical course after elimination of the exacerbation. The X-ray examination has been conducted using the stationary X-ray scanner Clinodigit EVO (Italrey, Italia) in two projections: direct and lateral, and in the outpatient conditions it was made only in the lateral projection according to the in-house method immediately after the introduction of the roentgen-contrast medium using the suggested plastic catheters (Fig. 2). The amount of required contrast agent to fill the duct system of the parotid glands in children of different age groups was determined using the data presented in the dissertation of P.I. Tkachenko (1998).

Results and discussion

In the active clinical course at the period of exacerbation of chronic process in the parotid gland the patients had major complaints on the presence of significant swelling in the parotid-masticatory region and pain. Out of 21 patients 8 experienced radiating pain in the ear and temple. All patients had salty taste of the oral fluid, and their general condition and appetite was worsened. The body temperature increased from 37.4°C to 38.0°C.

The disease history has revealed that 1 patient experienced up to 9 exacerbations a year; 5 patients – 7-8; 8 patients – 5-6 and 7 patients – 3-4. The most frequent severe and prolonged exacerbations occurred during the spring and autumn periods. Clinical analysis of the peripheral blood showed minor leukocytosis in all children and accelerated erythrocyte sedimentation rate from 16 to 20 *mm/h* in 8 children. No changes in the urine have been found.

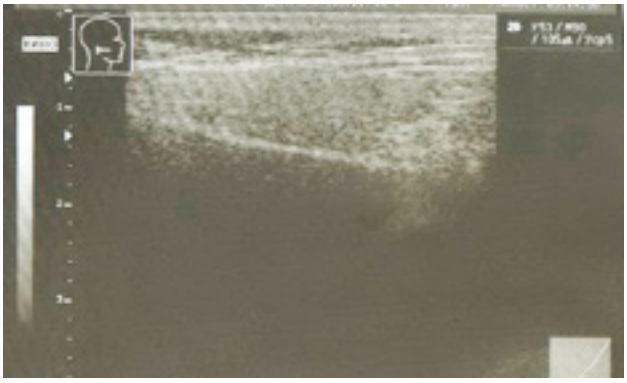

Figure 1. *Ten-year-old child K. Ultrasound image of the parotid gland without lesions. The capsule is detected in the form of the echo-dense line, and gland parenchyma has homogeneous fine-grained structure*

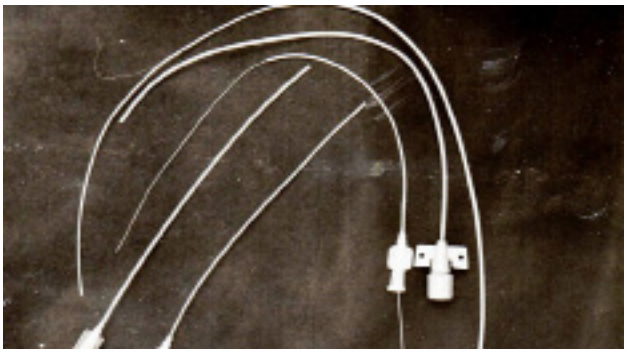

Figure 2. *Plastic catheters for artificial contrast study of the parotid glands*

Figure 3. *The appearance of 12-year-old patient M., medical history No 243. Swelling of the soft tissues in the region of anatomical location of the right parotid gland. Diagnosis: exacerbation of the chronic parenchymatous parotitis on the right; active clinical course*

The external examination of patients revealed a significant swelling at the parotid gland location, which went beyond its anatomical limits (Fig. 3). In all patients the skin over the swelling was edematous and of normal color. A significant enlargement of the parotid gland was detected on palpation and in 17 patients it was solid and tuberous, whereas in 4 patients it was of solid elastic consistency. Palpation was accompanied by the severe pain in all segments of the gland. Enlarged and movable submandibular regional lymphatic nodes have been noted in 9 patients. Twelve patients had limited painful opening of the mouth.

Prolabium was without changes in all patients, and the oral mucosa was colored pale pink and well wetted only in 6 patients, whereas in 15 patients it was moderately dry. The mucous membrane around the orifice of the acini, involved into the inflammation, was edematous and hyperemic in the form of crown in all patients. In addition, in 14 patients the orifices of the main ducts gaped and in 17 patients viscous secreta mass excreted in moderate amount with large number of white flakelike inclusions on massaging; in 4 patients its amount was insignificant but with impurities.

On the day of admission the cytograms of parotid secretion revealed the significant accumulations of neutrophils against the background of the dense protein substrates, part of which had morphological features of destruction of the nuclei and cytoplasm. Few macrophages, lymphocytes and plasma cells were detected. As an example, figure 4 shows microphotogram of the parotid secretion smear of the right parotid gland of 12 year-old patient M., medical history No 243, at the time of the admission. Diagnosis: exacerbation of the chronic parenchymatous parotitis on the right, active clinical course. Against the background of the dense protein substrates the accumulations of significant number of neutrophils, single lymphocytes, monocytes, eosinophil cells are detected. Along with the presence of inflammatory cells, single cells of the squamous epithelium, sometimes with destructions, have been found in the cytograms of 7 out of 21 patients. A significant amount of coccal flora, which was located both intra- and extracellularly has been found in all specimens.

Ultrasonography of parotid glands was performed for all children at the time of the exacerbation. At the same time the capsule appeared to be scirrhous, and the gland parenchyma had a heterogeneous structure due to the presence of sialectasis of different sizes around which its echodensified tissues were arranged. Diagnosis: exacerbation of the chronic parenchymatous parotitis on the right, active clinical course. The capsule of the gland is visualized in the form of the echo-dense line and in separate segments of the gland the presence of sialectasis of 2-4 mm in diameter and indurated parenchyma surrounding them is visualized (Fig. 5). Unfortunately, it was not possible to determine the degree of alterations in the structure of the whole gland, nor was it feasible to clarify the nature of disturbances in its duct system. Therefore, for that pe-

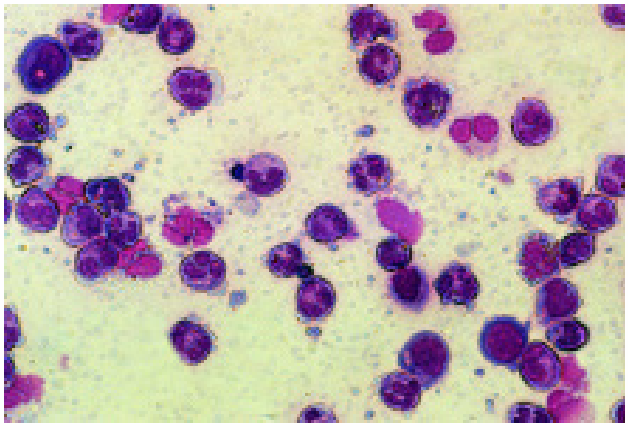

Figure 4. *Microphotogram of the parotid secretion smear of the right parotid gland of 12 year-old patient M.*

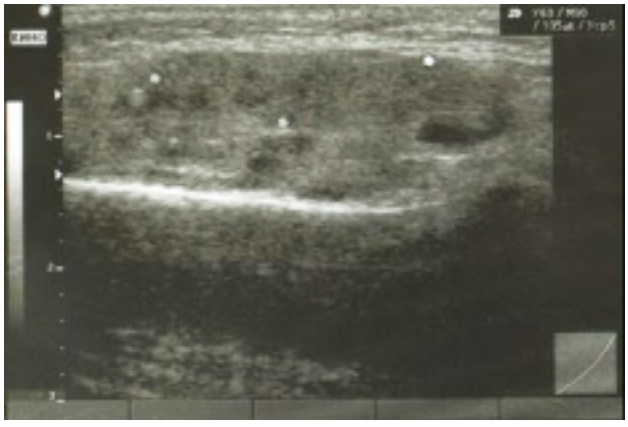

Figure 5. *Ultrasound image of the left parotid gland of 12 year-old patient M., medical history No 243.*

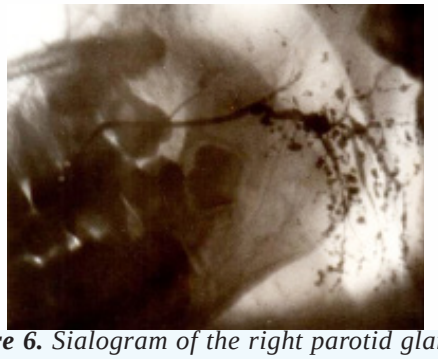

Figure 6. *Sialogram of the right parotid gland (lateral projection)*

Figure 7. *Sialogram of the right parotid gland*

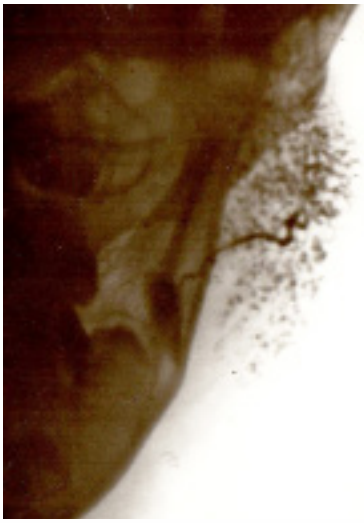

Figure 8. *Sialogram of the left parotid gland (direct projection)*

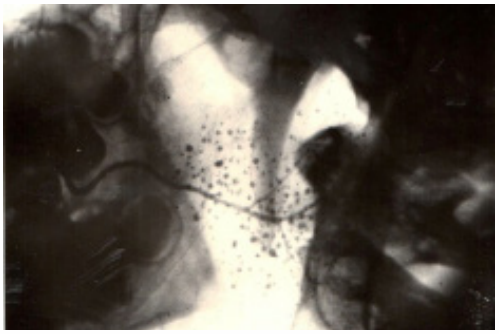

Figure 9. *Sialogram of the right parotid gland*

riod of examination, we managed to ascertain only the fact of existence of sialectasis and their size.

X-ray examination of parotid glands, carried out for all children of this group after elimination of exacerbation, showed multiple sialectasis up to 2-4 *mm* in diameter in the gland parenchyma of 6 patients (28.4%). At the same time, heterogeneous dilatation of the main duct and I-III type ducts was detected in 3 of them (50.0%) (Fig. 6).

Sialodenography, performed for 5 patients (23.8%), revealed a heterogeneous arrangement of sialectasis of different sizes (1 to 4 *mm* in diameter) in all lobes of the gland with minor dilatation of the main duct and some smaller ducts (Fig. 7).

The size of multiple cavities with diffuse localization in the gland was 1 to 2 *mm* in diameter in 6 out of 21 patients (28.6%). The main duct was contrasted clearly, but smaller ducts were not detected (Fig. 8).

Contrast study of the duct system of 4 children (19.0%) allowed revealing in the gland parenchyma the moderate number of sialectasis from 1 to 3 *mm* in diameter. At the same time the main duct had clear margins, and smaller ducts were also detected in some lobes (Fig. 9).

Conclusion

Thus, the ultrasonic biolocation of the parotid glands in chronic parenchymatous parotitis makes it very likely to detect the presence of sialectasis in it and can be used as an important diagnostic test, promoting the dynamic monitoring the changes in the parenchyma without compromising the child's health. Unfortunately, this method of study does not make it possible to fully define the nature of anatomical changes in all structures of the glands.

Sialodenography is more informative, enabling the establishment of significant and apparent disturbances in the gland parenchyma, deformation with dilatation of its main excretory duct and smaller ducts. The comparative characteristics of the detected anatomical changes revealed that the degree of manifestation of disturbances in the gland to a large extent correlates with the clinical progress of the disease and influences the nature of the pathological process.

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