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The role of immunologic values in the pathogenesis of chronic rhinosinusitis in children

Abstract: The results of the performed researches showed that children with chronic rhino sinusitis had decrease of cell-mediated values of the immunity expressed in the suppression of the functional activity of leukocytes, lymphocytes and T-lymphocytes with the background activation of B-lymphocytes and apoptosis factor.

Keywords: chronic rhinosinusitis, children, immune status.

Intriduction. In the literature of the last years there is active discussion of rhino sinusitis pathogenesis, and, particularly, the role of pro-inflammatory cytokines and the factors of local protection in the inflammatory focus [3, 7–12; 4, 144–147]. It was detected, that in case of chronic putrid rhino sinusitis a misbalance of IL-1 family protein production and disorder of IL-1 β and IL-1RA production correlation occurs to the side of IL-1 RA increase, and, as a result, the complete pathogen elimination does not happen [1, 29–36]. A great attention in the pathogenesis of rhino sinusitis is paid to the evaluation of neutrophile phagocyte activity. According to the majority of researches [2, 12–14] the functional activity of phagocytosing cells in the focus of inflammation, as a rule, turns to be decreased. At the same time, it is impossible to make a definite conclusion about activity of phagocytes in peripheral blood in case of local inflammation, as the published data are very controversial and most of them were held among adults. There are few studies of the peculiarities of immunologic values in children.

The continuous growth of chronic rhino sinusitis morbidity in spite of application of seemingly very effective methods of conservative and surgical therapy makes it possible for the experienced and qualified scientists to note that etiopathogenetic mechanisms of rhino sinusitis still cannot be considered to be studied enough, as the whole complex of therapeutic measures is based on the account of these mechanisms.

The aim of the research is to study the immune response in case of chronic rhino sinusitis in children.

Materials and methods of the research: the research is based on the data of examination of 86 children with CRS from 3 to 14 years old. The medical examination was performed in TashPMI clinics in the department of otorhinolaryngology with immediate participation of the Uzbekistan AS Immunology Institute immune regulation laboratory. There were 32 boys

and 54 girls among the patients; the average age of the patients was 8.5 ± 3.75 years old.

Control group included 20 practically healthy children.

Complex clinical-laboratory research methods including the study of anamnesis morbid, complaints, ENT organs' objective examination, roentgenoscopy of para-nasal sinuses and the examination of transport function of nasal mucous membrane with the definition of muco-ciliary transport time were used for the diagnosis.

All the examined children got the detailed blood immune analysis. The values of the 20 practically healthy children served for control.

Complex immunologic analysis including phenotype values of mononuclei of the peripheral blood such as CD3, CD4, CD8, CD16, CD19, CD25, CD95, CD38 and immunoglobulins of the essential classes IgA, IgM, IgG, and IRI (CD4+/CD8+) was held in 30 children with chronic rhino sinusitis. Immunoglobulins were detected by means of Manchini's method.

Statistic processing of the data was performed using the standard set of Windows XP MS Excel applied statistic analysis software and suggested the calculation of arithmetic mean value and mean square deviation. The estimation of value difference reliability was done with the help of Student's parametric criteria and Mann-Whitney's non-parametric criterion. The difference was considered to reliable one with $p < 0.05$.

The results of the research. The main reason of RS development in children of the examined group was acute respiratory viral infection. ARVI preceded the disease in 34.5 % cases, factor of over-cooling in 28 % patients, 37.5 % patients could not link the inflammation with any external reason.

The duration of CRS exacerbation was 16.2 ± 2.8 days, the frequency of exacerbations from 1 to 4 times per a year and the disease prescription from 3 to 10 years.

The study of inflammatory process location showed that among the patients with chronic inflammation of PNS mucous membrane people with bilateral putrid maxillary ethmoiditis prevailed. 39.5% patients with CRS had explicit manifestations of acute stage inflammation characteristic for the “active” progress of inflammatory process.

The progress of CRS in 64 (74.4%) children was aggravated by complications and associate ENT pathology among which there are 18 children (28.1%) with 1–2 degree adenoids, 4 (6.2%) allergic rhinitis, 6 (9.3%) vasomotor rhinitis, 12 (18.8%) curvature of nasal septum without disorder of nasal breathing, 3 (4.7%) poor hearing cases, hypertrophy of palatine tonsils in 11 children (17.2%), and 5 (7.8%) chronic tonsillitis. Nasal polyposis was detected in 73 (84.9%) children with CRS: 1 degree — in 28 (38.4%) children, 2 degree in 25 (34.2%) children, 3 degree in 20 (27.4%) children. Polypus of these children are apparently visible together with explicit external manifestations — open mouth and hyper telorism.

The analysis of the performed immunologic researches in children with CRS in relation to the values of practically healthy children showed a reliable decrease of T-lymphocyte populations and sub-populations.

As it is seen from the achieved data, children with CRS had noted double decrease of leukocytes in comparison with the control group (3.13 ± 1.8 con 6.9 ± 0.60) with the background reliable rise of relative and decrease of absolute lymphocytes ($P < 0.001$).

T cellular line of the immunity in the children with CRS is characterized by a reliable decrease of CD3 both absolute and relative number ($P < 0.01$) with the background rise of CD4 and CD8 ($P < 0.05$). The misbalance of these values was reflected on the IRI level which was reliably decreased in the children with CRS in comparison with the control group ($P < 0.05$).

The amount of NK lymphocytes in an organism defines their cyto-toxic activity in relation to proper cells with altered antigen structure — so-called immunologic monitoring function. Besides that, they actively secrete cytokines. True NK perform antibody-independent lysis — unconditional killers — they are able for cell lysis only because of their alien genetic origin. Among the superficial NK receptors CD16 should be noted. In compliance with the achieved data children with CRS had reliable rise of the relative value of that figure (29.8 ± 0.79 con 24.9 ± 1.57 ; $P < 0.05$).

We could also observe misbalance in B-cellular line of immunity characterized by the rise of CD20 sub-population values ($P < 0.05$).

Any immunologic reaction independently on the prevailing humoral or cell-mediated response starts with proliferation. One of proliferative process evaluation criteria can be increase or decrease of IL-2 (CD25⁺) receptor lymphocyte amount. The study of the amount of lymphocytes with CD25⁺ early activation markers showed that children with CRS had reliable registered rise of the relative value (30.10 ± 0.67 con 25.6 ± 1.90 %) and reliable decrease of absolute (484.1 ± 410.5 con 544.6 ± 79.30), i. e. misbalance of these values is observed.

Comparative analysis of the achieved results revealed increased expression of CD95 receptors on lymphocytes proving activation of apoptosis processes. It is known that proliferative processes in children prevail destructive ones; that's why apoptosis activation in children is lower than in adults. Children with CRS are prescribed to get stimulation of apoptosis which can lead to physiologic exhaustion of immune system reserve in these patients.

In the study of humoral line of immunity of the children with CRS we could observe a reliable decrease of IgA, IgM, IgG, almost 1.5 times different from the control values ($P < 0.05$ – 0.001).

Thus, from the given data we can see that children with CRS have more explicit deviations of cell-mediated, humoral and non-specific immunity values in comparison with the control group. The determined orientation of the immune drifts and explicitly of these drifts indicates the important pathogenetic role of immune mechanisms in the development and progress of CRS in children.

Conclusions:

1. Children with chronic rhino sinusitis had noted decrease of cellular values of the immunity expressed in the suppression of the functional activity of leukocytes, lymphocytes and T-lymphocytes with the background B-lymphocyte and apoptosis factor activation.

2. A significant decrease of humoral immunity expression was determined in children with chronic rhino sinusitis, resulting in the decrease of organism ability to develop specific immune response.

3. The leading role in the pathogenesis of chronic rhino sinusitis in children is played by immune pathologic processes which can lead to the development of hyperactive inflammation in mucous membrane of nasal cavity and lower parts of respiratory tract with the background general functional misbalance of the immune system.

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The methodology of back lateral endoscopic percutaneous transforaminal extraction of intervertebral hernia under X-ray control

Abstract: The method of minimally invasive surgery of extraction of intervertebral hernia is described. The advantages of back lateral endoscopic percutaneous transforaminal extraction of intervertebral hernia under X-ray control are showed in this article.

Keywords: minimally invasive surgery, endoscopic discectomy, intervertebral hernia, percutaneous

Introduction

World's sciential and technological progress during last 20 years contributed to emergence of minimally invasive surgery. The methods of laser vaporization of intervertebral hernia, cold ablation, endoscopic mechanical discectomy, the wrinkling of hernia with drugs were created and put in practice. The rapid increase of minimal invasive surgeries of intervertebral hernia was observed from 1995 to 2000. Endoscopic extraction allows extracting intervertebral hernia with mechanical method. The indications and results of endoscopic discectomy are often incompatible [3, 545–51; 4, 633–651; 9, 317–324; 14; 15, 21–30; 1; 5, 405–419; 17, 225–229]. Some authors think that endoscopic surgery has strict limits and their results don't differ from the results of intervertebral hernia vaporization. Other authors have developed the techniques of endoscopic surgery and they offer it for intervertebral hernia extraction despite the size and location [11, 23–32; 13, 2231–2239; 12, 311–320; 8, 121–128; 7, 314–318; 2, 157–174; 6, 557–560]. The types, indications, efficiency of endoscopic surgery are incompatible in literatures. There are many methods of minimal invasive surgery and the most efficient should be chosen, which will allow operating on intervertebral hernias despite size and location [10, 210–217; 16, 349–353].

Material and Methods

With endoscopic transforaminal method we have operated on 203 patients. In 11 (5,4%) cases patients were operated on because of foraminal stenosis of spine tube. In 192 (94,6%) cases patients were operated on because of intervertebral hernia.

In our studies 95 (46,8%) patients had intervertebral hernia on L4-L5 level, in 70 (34,4%) cases the intervertebral hernia was on L5-S1 level and in 27 (13,4%) cases it was on L3-L4 level. We have operated on patients with foraminal, extraforaminal, lateral, central and mix located intervertebral hernia. We have used tools and endoscope for intervertebral hernia extraction produced by Karl Storz and Max-More. The operations were done under neuroaxial epidural anesthetization. While epidural anesthetization the patients' consciousness was clear and the motor function of lower limb was preserved in contrast to spinal anesthetization. While epidural anesthetization nerve root damaging is excluded. If the surgical tool touches nerve root the patients will feel it and will inform the surgeon. The patients' position on surgical table is on the opposite of hernia. The surgical entrance is above ischium top, 10–12 cm. lateral from medium line. Inserting the needle from this point it reaches to the required level of art, after which X-ray scope is done. Removing the needle metal pin is put into it, then the