THE PERSPECTIVE OF PROGNOSING THE EXTENT OF ADHESIONS IN PATIENTS AFTER ABDOMINAL OPERATIONS

The resume
In this work diagnostic capability of N-acetyltransferase in prognosing the extent of possible adhesions in the abdominal cavity in the early postoperative period is presented. It was established that in the postoperative period the level of N-acetyltransferase was increased in the urine of patients compared with the preoperative period. The difference between levels of enzyme in patients where operative treatment was accompanied by the greatest injury is especially expressed.

Keywords: forecasting, N-acetyltransferase, formation of adhesions.

Despite the advances and progress of modern medicine, adhesive disease is currently still one of unsolved and actual problems of surgery. The frequency of the adhesive disease, difficulties of early recognition, absence of clear criteria for treatment strategy with unsatisfactory outcomes make the problem of adhesion syndrome always actual [2, 6, 7, 8, 9]. In the last decade a lot of methods of diagnostic of adhesive disease were suggested, but all of these methods are relative and primarily directed to recognition, but not prediction of pathology. This does not allow the surgeon with great caution to conduct prevention activities of formation of abdominal adhesions in the early postoperative period.

Recently the study of the pathogenesis of intraperitoneal adhesions revealed that fibrillogenesis of connective tissue is mainly determined by genetically-determined polymorphism of the phenotype of N-acetyltransferase, which transfers an acetylic group from the acetylensyme's molecule to a primary amino group of various substrates, including glucosamine and galactosamine, and its main function is acetylating of metabolic products.

N-acetyltransferase is a constitutive enzyme, the activity in the body which people are divided into two groups: those with a phenotype of rapid and slow acetylation.

Cellular and fibrous components of connective tissue are embedded in the extracellular basic substance – proteoglycans, the metabolism of which is determined by the N-acetyltransferase enzyme. Research by Gladkikh S. P., 1984, and Magalashvili R. D., 1982, proved that people with rapid acetylation phenotype the biosynthesis of the extracellular component of connective tissue predominates over its catabolism, i. e. the formation of adhesions prevails over the process of their lysis. When applied to such patients injured in the abdominal cavity a pronounced adhesive perivisceritis was developing. Conversely, people with a phenotype of slow acetylating the biosynthesis of extracellular component of connective tissue compared to its catabolism are slow. When applied to abdominal trauma in this patients the adhesion process are small or absent [2, 3]. Thus, by the Gladkikh SP 1984, Podymov VK 1979 determined, that one cause of increased tendency to adhesion formation is acetylating activity of the body, damage of the peritoneum, the operation, inflammation are non-specific permissive factor, such as "trigger" of excessive biosynthesis of the extracellular component of connective tissue [1, 5]. With the results of these studies we can with most likely assume that the adhesive perivisceritis in the abdominal cavity is a distinct disease, genetically determined by the constitutive enzyme N-acetyltransferase, and a main role in abnormal development of connective tissue in the abdominal cavity belong to this enzyme.

The purpose of our study is identification of correlations the activity of N-acetyltransferase among operated patients depending on the traumatism of operation and severity of adhesive process in the abdominal cavity in the early postoperative period.

Materials and methods

The study was conducted on 23 patients admitted to the surgical department of Blagoveshchensk City Hospital for the planned surgical treatment. Age of patients ranged between 31 and 72 years. Among all patients women were 18 (60,86 %), men – 9 (39,14 %).

65,21 % of patients had surgical operations in anamnesis, in 34,79 % - anamnesis without surgical operations.

The group consists of patients with predisposed to adhesive formations. The predisposed to adhesive formation was determined by the Prebsting's method, modificated by A. M. Timofeeva, 1971, which based on determination of N-acetyltransferase level in urine [4].

Among the total number of patients, 16 patients were operated in the amount of laparotomy with hernioplasty of postoperative ventral hernias, and 7 patients were operated in the amount of laparotomy with cholecystectomy for chronic calculous cholecystitis.

For determining of difference between the levels of N-acetyltransferase before operations and after operations in all patients was investigated activity of N-acetyltransferase at the 3rd day of postoperative period.

For performing of acetylating reaction used method of determining free and acetylated streptocide in six-hour urine sample after a single oral dose of the drug test. Test dose is shown in Tab. 1. In the test tube with 0,2 ml of urinal fluid added 2 ml of 15 % solution of trichloroacetic acid, 1 ml of 7 % solution of hydrochloric acid, then 6,8 ml of distilled water. The tube was centrifuged during 10 minutes. The supernatant solution was poured into two 2,5 ml-tubes (tube 1 and tube 2).

For determine the free streptocide in tube 1 add 0,1 ml of 0,5 % $NaNO_2$, after 10 minutes – 1,5 ml of a saturated solution of trihydrate sodium acetate and 0,25 ml of resorcinol, exposure – 15 minutes. In the control tube instead of the supernatant fluid using 2,5 ml of distilled water. Content of tube 1 was examined by photocalorimetry, the scale is set to 0 by control tube.

For determine the total streptocide in a test tube 2 was added 0,25 ml of 7 % hydrochloric acid solution and placed in a water bath for 30 minutes, after cooling add 0,1 ml of 0,5 % solution of $NaNO_2$, exposure 10 minutes. Then add into 1,5 ml of sodium acetate and 0,25 ml of resorcinol, exposure 15 minutes. In the test tube these drugs mixed with 2,5 ml of distillated water in the same sequence. The sample is examined by photocalorimetry, scale is set to 0 by the control tube (5 mm-cuvette, wavelength – 490 nm).

The percent of acetylating was calculated by the formula $K=(O - Г)/O \times 100$ % (K – the percentage of acetylating, O – the rate of total streptocide, Г – an indicator of free streptocide). The study approved by the Committee of Biomedical Ethics of ASMA (protocol # 5, Jan. 21, 2010).

Results and discussion

All of patients with abdominal surgical operations in anamnesis (65,21 %) during laparotomy intra-abdominal adhesions were found.

6 patients had viscero-parietal adhesions mainly in the ileum's region, without visual deformation of intestinal tube. 9 patients had viscero-parietal adhesions with adhesions of the greater omentum with postoperative scar. 7 patients had deformations of small intestine due to intra-abdominal adhesions. In all of the above cases, the dissections of intraperitoneal adhesions were performed.

Postoperatively, in all patients wounds healed with primary intention, symptomatic therapy due to main disease.

At 3 days of postoperative period in all patients the level of N-acetyltransferase activity in the urine by the above methods were studied.

Statistical processing of the results of the study was performed using Statistica 6.0 software. Differences in the comparing groups was considered at a significance level of 95 % ($p<0,05$).

The obtained data are expressed in percentages.

Analyzing the results (presented in the chart 1) the increasing of N-acetyltransferase activity by an average of 13 % in the postoperative period was found. Particularly high enzyme activity was observed in patients where surgery was accompanied by the greatest injury.

All patients were discharged from the hospital after 9 – 11 days in satisfactory condition for ambulatory treatment.

Thus, obtained data shows that during postoperative period the activity of the N-acetyltransferase in the body were increased, with the highest levels of the enzyme in patients, where operation was accompanied by a massive injury. The observed phenomenon is likely to be associated with the participation of this enzyme in the synthesis of connective tissue formed part of the intraperitoneal adhesions.

Our research provides preconditions to further deeper study of correlation between the change of level of the activity of N-acetyltransferase in the body and the degree of formation of intraperitoneal adhesions.

Conclusions

1. The significant increase of N-acetyltransferase activity in urine of tested patients during postoperative period is found clinically.
2. The highest level of enzyme activity in patients with established where surgery was accompanied by the greatest injury.
3. Considering the literature data of the important role of N-acetyltransferase in the formation of connective tissue, we consider, that increasing level of activity of this enzyme in the postoperative period can be prognostic sign of progression of adhesion formations in the abdominal cavity.

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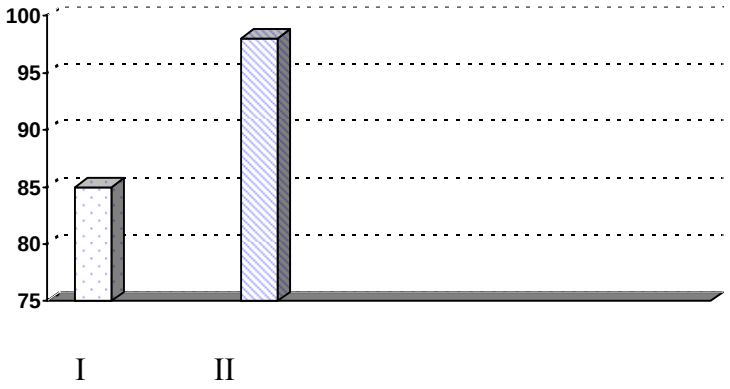

Pic. 1 Average correlation level N-acetyltransferase in the urine of patients with pre- and postoperative period, in percentage terms. Indicated by the horizontal average level of N-acetyltransferase: I - preoperative period, II - postoperative period.

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