UDK: 616.366+616.366-02+616.379-008.64

Pyuryk M.V.

Changes in the Structure of the Gallbladder Wall in Patients with Chronic Calculous Cholecystitis with Concomitant Diabetes Mellitus

SHEI «Ivano-Frankivsk National Medical University», Ivano-Frankivsk, Ukraine, clavic2002@yahoo.com

Abstract. According to modern international research data epithelium of gallbladder wall involved in the formation of bile components. Gallbladder disease is accompanied by certain structural changes in its wall. We have made morphological research of the gallbladders from 44 patients with the chronic calculous cholecystitis (I group) and 45 patients with the chronic calculous cholecystitis with the attendant diabetes mellitus (II group) to find out the patho-morphological peculiarities of the gallbladder's wall. We found out that in patients with the chronic calculous cholecystitis with the attendant diabetes mellitus more frequent (in 33.3% patients) accordingly to the patients with the chronic calculous cholecystitis (in 13.6%), there were total necrosis of the organ. During the research of the gallbladder in patients of the II group we have find out the inflammation processes, sclerosis, infiltration of the mucosa with the xanthome cells, the decreasing of the mucosal activity of the epithelium of the mucosa, the decreasing in this group of patients the sizes of the gallbladder ($p<0.05$) because of the sclerosis. For the patients of the I group the characteristic was the increasing of thickness of the gallbladder wall because of the hyperplasia of the mucosa and hypertrophy of the muscle lay. There were more often numerous concrements in the gallbladder of the patients of the II group, according to the data of the I group patients.

Key words: chronic calculous cholecystitis, gallbladder, diabetes mellitus.

Problem statement and analysis of recent research. Modern scientific sources highlight research results which proved active participation epithelium of the gallbladder in the formation of bile components [1, 2, 9]. Dysfunction of the gallbladder mucosa leads to changes in the composition of bile and decrease functional activity of macrophages, resulting in further education of the xanthome stroma cells in the mucosa. Published several studies about histopathological characteristics of the gallbladder wall in chronic calculous cholecystitis and cholesterosis of the gallbladder [1, 3, 7]. However, changes in the structure of the gallbladder wall in patients with diabetes mellitus (DM) in the literature are not covered fully [4, 8, 9].

The aim of the study: to study histopathological features of the gallbladder wall in patients with chronic calculous cholecystitis with concomitant diabetes mellitus.

Materials and methods

We have explored 89 gallbladders that were removed during planned laparoscopic cholecystectomy in patients with the diagnosis chronic calculous cholecystitis. Patients were divided into 2 groups. I group consisted of 44 patients with chronic calculous cholecystitis without diabetes mellitus, II group - 45 patients with chronic calculous cholecystitis and concomitant diabetes mellitus type II. In all patients cholecystectomy was performed routinely at the base of minimally invasive surgery Ivano-Frankivsk Regional Hospital.

In all cases there were performed macroscopic and histopathological study of surgical specimens (gallbladder). The Protocol of macroscopic study provided a description exterior body, its size and content. Gallbladder was fixed in 10.0% neutral formalin solution (Ph-7.0). Fixation time fixing was 24 hours.

Histopathological study was conducted at the Department of Pathology of the Ivano-Frankivsk National Medical University. For histopathological study fragments of the gallbladder wall were taken from the bottom, body and neck. The studied fragments we cut by length of 1.0 cm and a thickness of 0.3 cm so that in histological preparations there was entire bladder wall (from the mucous to serous membrane). The obtained sections of the walls of gallbladder were stained with hematoxylin and eosin, Masson (for detection of collagen fibers), altsian blue by Stidmen (the research of nonsulfated glycosaminoglycans) and using PAS-reaction (for sulfated glycosaminoglycans identification).

Research results

During the study of research's results we have noticed that in the I group patients macroscopically serosa of the gallbladder was rough, with fragments of connections connective, inner small mesh look through multiple mucosal thickening. Pathological process (hypertrophy of the mucous membrane) mainly localized in the body and the bottom of gallbladder (29 patients - 65.9%). In the bottom of gallbladder pathological changes were found in 9 patients (20.5%). The total destruction of all organ was noted in 6 patients (13.6%). The average size of gallbladder was 11.42±0.43 x 4.76±0.34 x 3.83±0.25 cm. Gallbladder wall was thickened evenly throughout and averaged was 4.87±0.42 mm. After study the content gallbladder cavity in 65.9% of cases were found multiple concrements (size from 0.2 to 1.8 cm in diameter) in 34.1% of cases - single (1.1 to 4 cm in diameter).

During the pathohystological examination of gallbladder in the patients of the I group we found revealed predominance chronic normo- and hyperplastic cholecystitis (80.4%). In case of hyperplastic cholecystitis mucosal folds were of different sizes and shapes. In case of simple type hyperplasia we visualized moderate increasing in height by folds lamina propria mucosa. In 52.3% of patients we observed the increasing in height folds of mucous by increasing the lamina propria mucosa with an increase in her collagen fibers and capillaries. Hyperplastic folds looked like micropolips - polypous type of hyperplastic cholecystitis. Adenomatous type of mucosa hyperplasia met rarely (3.4%). In all cases mucosa folds were mostly covered with single-layered prismatic epithelium with secretory activity. In some areas of the mucosa epithelium was absent. In the lamina propria of mucosa there were marked places of moderate sclerosis, lymphocytic-macrophage infiltration with moderate and advanced full-blooded vessels, the presence nonsulfated glycosaminoglycans. The presence of clearly visualized acidic glycosaminoglycans due to the phenomena of disorganization of connective tissue, as a result of chronic inflammation. Enlarged sinuses Rokitanskoho-Aschoff were found frequently. Come Luschka were cystic dilated, branched. In 47.7% cases the muscle layer was thickened because of the myocyte hypertrophy, among which there were located land fibers of connective tissue. In the cervical part of gallbladder the circular bundles of smooth muscle cells with the cystic duct muscular layer formed sphincter.

During the macroscopic study of gallbladder of the II group patients we observed that serous membrane had smooth shiny surface with no signs of strain. The mucosa was rough, there were thinning areas. The pathological process is also localized predominantly in the body and the bottom of gallbladder (23 patients - 51.2%). In the bottom of gallbladder pathological changes detected in 7 patients (15.6%). The total destruction of all organ was observed in 15 patients (33.3%). The average gallbladder size in the II group were 8.75±0.49 x 3.82±0.36 x 3.27±0.28 cm. A characteristic feature was uneven wall thickness of gallbladder, the average value of which was 3.48±0.56 mm. In 80.0% of cases we found in the gallbladder cavity multiple (from 0.3 to 2.4 cm in diameter) concrements, and in 20.0% of cases - single (1.2 to 3.8 cm in diameter) concrements.

According to the histopathological study in patients of II group there was predominantly hypoplastic chronic cholecystitis (75.6%), which was identified by broad and low folds of mucosa. However, 8.8% of patients of the II group mucosa did not formed folds, it indicates the development of chronic aplastic cholecystitis. Chronic hyperplastic cholecystitis was observed in 15.6% of patients of the II group. Usually there was simple type of mucosa hyperplasia (87.5%). Mucosa folds were covered with epithelium, secretory activity is slightly reduced, which manifested a decrease of glycosaminoglycans accumulated in

the epithelium. There was decrease of nonsulfated glycosaminoglycans in case of chronic calculus cholecystitis with concomitant diabetes mellitus.

During the study, the lamina propria of mucosa was presented with loose connective tissue with the presence of fibroblasts, lymphocytes, plasma cells, macrophages with multiple sclerosis centers. You can see that lamina propria was presented with connective tissue "transitional" type: from loose to dense amorphous.

A main feature of the chronic calculus cholecystitis in patients with concomitant diabetes mellitus was the presence in mucosa lamina propria the xanthome cells (66.7% of cases). In 22 patients (73.3%) xanthome cells look like pockets of various sizes in a localized in the upper stromal folds of mucous membrane, and in 8 patients (26.7%) xantome cells were found at the base of folds in the deep parts of the lamina propria mucosa.

The muscular coat of gallbladder consists of muscle cells in a grid. Between the smooth muscle cells there was visualization of proliferation of collagen fibers with secondary atrophy of smooth muscle cells. In the muscular membrane observed a small amount of lymphocytes and macrophages. In some cases it was marked xanthome infiltration of muscle coat.

In the patients of the II group vessels of lamina propria of mucosa, muscular and serous membranes contained PAS-positive substance in the basement membrane, which led to its thickening and probably a violation trophic of gallbladder wall. Final results trophic disorders manifest processes described above pronounced sclerotic processes of the lamina propria and muscle membranes.

Discussion

Thus, as a result of the study identified a number of morphological features state of the gallbladder wall in patients with chronic calculus cholecystitis and concomitant diabetes mellitus. In both groups the most often the damage was expressed in the bottom and body apparently due to the peculiarities of blood supply to the gallbladder. In patients with chronic calculus chulecystitis and concomitant diabetes there were significantly more frequently (in 33.3% of patients), compared to patients with chronic calculus cholecytitis (at 13.6%) manifested total destruction of all organ. According to the literature in patients with chronic calculus cholecystitis and concomitant diabetes mellitus the main feature of the structure was a bladder wall lipid infiltration of the mucosa [1, 9], other authors point to the predominance of sclerotic processes in gallbladder [7, 8]. According to our study we found the combination of mucose membrane lipid infiltration and sclerotic processes in gallbladder. In addition, we found signs of inflammation, reduction of epithelial secretory activity of mucose membrane, the tendency to reduce the gallbladder size ($p<0.05$) due sclerosis. It was higher frequency of multiple concretions, compared with those without diabetes mellitus. In patients without concomitant diabetes mellitus the main characteristic of chronic calculus cholecystitis was increased wall thickness of gallbladder by mucosal hyperplasia and hypertrophy of the muscle layer. These features should be considered in the surgical management of patients.

Conclusions

1. In patients with chronic calculus cholecystitis and concomitant diabetes on 15.0% more frequent were identified multiple calculus in the lumen of gallbladder and on 55.0% more often was diagnosed hypoplastic chronic cholecystitis.

2. In gallbladder wall of patients with chronic calculus cholecystitis and concomitant diabetes mellitus during pathomorphological research we found out phenomena pronounced sclerosis of mucous and muscular membranes, lipid infiltration with formation of xanthome cells and decrease secretory activity of epithelial folds mucosa.

Prospects for further research

The results justify the need for research to develop a new algorithm of surgical operations for patients with chronic calculus cholecystitis and concomitant diabetes mellitus, the means of finding new pharmaceuticals that would help optimize treatment and reduce complications in these patients, which is the basis for further research in this direction.

Literature

1. Balabay A.A. The structure of the gallbladder mucosa. Visn. probl. boil. i med. 2006; 2: 174-177.

2. Bogatyrova O.E. Morphological characteristic of the gallbladder cholesterosis. Ros. gastroenterol. zhurnal; 2000; 4: 107.

3. Human histology: textbook / O. D. Lutsyk, A. I. Ivanova, K. S. Kabak, Y. B. Chaykovsky K. : Knyga-plus, 2013: 582.

4. Shcherbynina M.B. Cholesterosis and chronic cholecystitis: comparable analysis of the gallbladder wall state. Morphology. 2007; 3: 94-100.

5. Ultrstructure changes in gallbladder mucosa during cholesterose formation. Morozov I.A., Homeryky S.G., Ilchenko A.A. Hepatologiya. 2005; 5: 20-22.

6. Goyal S, Singla S, Duhan A. Correlation between gallstones characteristics and gallbladder mucosal changes: A retrospective study of 313 patients. Clin Cancer Investig J 2014; 3:157-61.

7. Ronald P.J. Oude Elferink Function and pathophysiological importance of ABCB4 (MDR3 P-glycoprotein) // Eur J. Physiol - 2007. - Vol. 453. - P. 601-610.

8. Portincasa P. Colesterol gallstone diasease / P. Portincasa, A. Moschetta, G. Palasciano // Lancet. - 2006. -Vol. 368. - P. 230–239.

9. Jai Hoon Yoon. ATP-Binding Cassette Sterol Transporters are differentially expressed in normal and diseased human gallbladder / Jai Hoon Yoon, Ho Soon Choi // Dig. Dis. Sci. - 2012. - Vol. 39, №1. - P. 14-21.

Пюрик М.В.

Структурні зміни у будові стінки жовчного міхура у хворих на хронічний калькульозний холецистит з супутнім цукровим діабетом

ДВНЗ «Івано-Франківський національний медичний університет», м. Івано-Франківськ, Україна, clavic2002@yahoo.com

Резюме. Згідно сучасних міжнародних досліджень епітелій стінки жовчного міхура бере участь в утворенні компонентів жовчі. Захворювання жовчного міхура супроводжуються певними структурними змінами в його стінці. З метою вивчення патоморфологічних особливостей стінки жовчного міхура у хворих на хронічний калькульозний холецистит із супутнім цукровим діабетом провели морфологічне дослідження жовчних міхурів 44 хворих на хронічний калькульозний холецистит (I група) та 45 хворих на хронічний калькульозний холецистит з супутнім цукровим діабетом II типу (II група). Для патогістологічного дослідження фрагменти стінки жовчного міхура брали з дна, тіла та шийки. Встановлено, що у хворих на ХКХ із супутнім ЦД достовірно частіше (у 33,3% хворих), порівняно з хворими на ХКХ (у 13,6%), виявлялось тотальне ураження всього органу. При дослідженні ЖМ у хворих II групи виявлено прояви запального процесу, вираженого склерозу, інфільтрацію слизової оболонки ксантомними клітинами, зменшення секреторної активності епітелію слизової оболонки, а також спостерігалась тенденція до зменшення у пацієнтів цієї групи розмірів ЖМ за рахунок склерозування. Для хворих I групи характерним було збільшення товщини стінки ЖМ за рахунок гіперплазії слизової та гіпертрофії м'язової оболонок. У досліджуваних нами хворих II групи частіше зустрічалися множинні конкременти, порівняно з даними пацієнтів I групи.

Ключові слова: хронічний калькульозний холецистит, жовчний міхур, цукровий діабет.

Received 22.06.2015.