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Microbiological aspects of acute cholecystitis

Abstract

Currently, the bacteriocholism is increasingly mentioned among the etiological factors of the development of the biliary tract pathology, as well as postoperative complications during interventions on the organs of the hepatobiliary system. The frequency of aerobic bacteriocholism in acute cholecystitis is 50-98%, in chronic cholecystitis – 22-60%, in choledocholithiasis – 58-95%, in mechanical jaundice – 95%. In our investigation it was found that, regardless of the nature of the biliary tract lesion, enterococci were the dominant biliary cultures. Bacteriocholism is considered as a risk factor for the development of postoperative infectious complications. Thus, the role of bacteriocholism is currently beyond doubt as one of the significant factors of pathology of the biliary tract.

Keywords: Bacteriocholism, acute cholecystitis, anaerobic, enterococci, E. coli

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Introduction

The management of acute cholecystitis requires an exact knowledge of the biliary microflora. Actually, bile in the biliary tract has been considered sterile. Considerable progress has been made in the understanding of hepatobiliary microflora and its clinical implications. Cultivation technics of fastidious microorganisms, especially anaerobic bacteria, as well as typing and susceptibility testing methods are now at an advanced level even in the routine clinical bacteriology laboratory. However, the question of the main etiological factor leading to the development of various pathologies of the biliary tract, including acute cholecystitis, still remains open.

Materials and methods

In our investigation carried out in the period from 2017 to 2021 at the Grodno University Clinic, we studied 500 patients with the age from 23 to 59 suffering from the acute cholecystitis. In 323 patients from the total amount, we have found the microflora in the contents of the gallbladder. 187 of investigated were males (58%) and 136 were females (42%). The research was carried out with the help of Automated microbiological Analyzer Vitek 2 Compact. It is a fully automatic system, which provides identification of microorganisms and determination of their sensitivity to antibiotics. The system is designed to identify gram-negative bacilli, gram-positive cocci, anaerobic bacteria, Neisseria, hemophilic bacilli, other whimsical bacteria, Corynebacteria, lactobacilli, bacilli, fungi (more than 450 taxa). During the operation of cholecystectomy, the contents of the gallbladder were taken and placed in an Analyzer, which automatically detected the pathogenic microorganism.

Discussion

In recent years, the discussion of the role of bacteriocholism in the occurrence of diseases of the biliary system and its impact on the results of surgical interventions become more and more actual in researchers.[1-4] It is noted that under physiological conditions, the sterility of bile is largely ensured by its bactericidal properties due to the antibacterial effect of bile acids.[1,5] Bile acids are one of the main elements of the protective system of the biliary tract. This system also includes Kupffer's cells of liver, the presence of secretory immunoglobulin A in bile, mucosal discharge of the epithelial lining of the biliary tract, the tight fit of hepatocytes to each other, constant outflow of bile, effective functioning of the Oddi's sphincter.[6,7] Microbial colonization of the biliary tract, initiated by bacterial adhesion, is one of the factors contributing to the development of biliary infection.[8-11] Judging by the other investigators data, the frequency of aerobic bacteriocholism in acute cholecystitis is 50-98%, in chronic cholecystitis – 22-60%, in choledocholithiasis – 58-95%, in mechanical jaundice – 95%.[12-15] The frequency of microbial excretion and the degree of bile contamination correlate with the severity of morphological changes in the gallbladder and are significantly higher in destructive cholecystitis than in catarrhal on.[13,16] The frequency of bile infection and the development of postoperative complications significantly correlate with the age of patients.[15]

The essential importance of the role of bacteria in the development of acute cholecystitis is also confirmed by the fact that microbes isolated from bile and the wall of the gallbladder are, as a rule, identical.[17]

During our study, it was found that, regardless of the nature of the biliary tract lesion, enterococci were the dominant biliary cultures, the frequency of which was 33.4%. E. coli (in 31.4% of cases) and Klebsiella pneumoniae (in 21.2% of cases) were less frequently have found. Other Enterobacteria accounted for 21.3%. Aerobic microorganisms in acute cholecystitis are isolated both in monocultures (in 65.2% of cases) and in associations with other aerobes (in 8.7% of cases).

Bile acids have been shown to enhance the degree of adhesion of E.coli to epithelial cells.[18,19] Its anti-lysozyme activity may play a pathogenetic role in the development of a chronic inflammatory process in the biliary system.[19,20] Our study shows the dependence of the frequency of isolation of microorganisms' associations on the clinical and morphological form of acute cholecystitis. Thus, associations of microbes are isolated more often in gangrenous cholecystitis than in its other forms. It is noted that in the vast majority of cases (75%), gram-negative bacteria represent the bile microflora. Our results show that the severity of clinical manifestations of acute cholecystitis depends on the type of etiologically significant bile microflora. Thus, the predominance of E. coli and Klebsiella is accompanied by more severe manifestations of cholecystitis than the predominance of enterococci or other types of microorganisms.

Bacteriocholism is considered as a risk factor for the development of postoperative infectious complications.[14,17,20] This opinion is indirectly confirmed in current study. It has been shown that in acute cholecystitis (in which bacteriocholism is noted with greater frequency), postoperative complications occur 2.4 times more often

than in chronic ones. The main pathogens of suppuration of surgical wounds after cholecystectomy are mainly enterobacteria and E. coli in most cases.[1,22]

It should be noted that the majority of microbiological studies of bile in acute cholecystitis are aimed at identifying aerobes, while works devoted to anaerobic bacteriocholy are practically absent. The latter is primarily explained by the fact that laboratory diagnostics of anaerobic infection is a rather difficult task that requires a highly qualified bacteriologist who owns anaerobic microbiological research techniques, as well as appropriate laboratory equipment, nutrient media, test systems, etc.[1,3,14,23]

The question of the etiological significance of anaerobic microorganisms in acute cholecystitis and its complications has not been resolved. The expediency of such studies is beyond doubt. According to some authors[8,22,24,25] the relevance of the problem of anaerobic infection in surgery continues to increase. This is due to both the role of anaerobic microorganisms (or their associations with aerobes) in the etiology and pathogenesis of purulent-inflammatory diseases, and their resistance to antibiotics, as well as the severe course of the lesions caused by them, which is accompanied by high mortality rates.[9,23,24,26-28]

Conclusion

Thus, the role of bacteriocholism is currently beyond doubt as one of the significant factors of pathology of the biliary tract. The available in the literature information suggest that the nature of the sown microflora affects the clinical development of the disease, the course of the postoperative period, the presence of combined lesions of the organs of the hepatopancreatoduodenal region, the nature of complications, changes in the immune status. The ambiguity of the assessment of the degree of participation of anaerobic microorganisms leaves open the question of their significance in the occurrence and development of cholelithiasis, acute cholecystitis and its complications. Further study of the microbiological aspect of acute cholecystitis and cholecystopancreatitis will expand current understanding of the etiology and pathogenesis of these diseases, improve their diagnosis and treatment.

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None.

Conflicts of interest

None.

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