

The Relationship between Cholelithiasis and Liver Enzymes in Elderly Patients

Almohamad Almahmud Tamim, Alexey Klimov*

Received: 02 April 2021 / Received in revised form: 02 June 2021, Accepted: 10 June 2021, Published online: 22 June 2021

Abstract

Inflammatory process caused by cholecystitis may be the reason for changing the functional tests of the liver, and these changes help reduce the risk of an Endoscopic Retrograde Cholangiopancreatography (ERCP) and predict stones in the bile ducts. The presented study was performed between October 2017 and December 2019 on 140 patients suffering from cholecystitis. This study sought to evaluate the role of liver function testing in diagnosing stones in the bile duct. Patients underwent surgically removing gallstones, then performing intravenous cholangiography for patients suspected of having biliary colic, and hepatic enzymes were measured from direct and total bilirubin, (ALP), Alanine Aminotransferases (ALT), and Aspartate Aminotransferases (ASTs) that were not mainly diagnosed. Based on the high level of hepatic enzymes, ALP, ALT, and AST did not have significant differences between the two study groups, so to make sure of the presence of stones, we rely on conducting ultrasound imaging before performing intravenous imaging of the bile duct ERCP.

Keywords: Liver tests, Bile duct, Retrograde cholangiopancreatography, Alanine Aminotransferases, Aspartate Aminotransferases

Introduction

The issue of gallbladder infections is the most common research issue at present because not a small percentage of people suffer from this problem, for example, it has been mentioned in some references that in the United States of America 10% suffer from cholelithiasis and that 11-25% have been associated with gallbladder disorders (Fan *et al.*, 2017; Jones *et al.*, 2020). With the rapid development of medical diagnostic and treatment techniques, many methods have been proposed to treat gallbladder disorders, such as laparoscopic cholecystectomy (Tang & Schlich, 2017), laparoscopy for common bile duct detection (Platt *et al.*, 2018), Magnetic Resonance Imaging of the bile ducts (MRCP) (Karwa, 2017), genetic imaging of the bile duct (ERCP) (Wong *et al.*, 2016), and ultrasound imaging of the liver and bile ducts (Worku *et al.*, 2020).

Almohamad Almahmud Tamim, Alexey Klimov*

Department of Surgery, Peoples' Friendship University of Russia (RUDN University), Moscow 117198, Russian Federation.

*E-mail: Klimov-pfu@mail.ru

Through the published research on this topic, it has been indicated that functional liver tests help detect the formation of stones in the bile duct and reduce the risk of ERCP implementation. It has been observed that liver tests in patients with cholecystitis are abnormal, and this reflects the physiological state of the disease. And as mentioned previously, these tests help diagnose the formation of a stone in the bile duct, and as well as in its treatment and the need for imaging or surgical intervention.

Materials and Methods

The study has been performed between October 2017 and December 2019 at the City Clinical Hospital 64, which was later called V.V. Vinogrador. The total studied samples were 140 patients with cholecystitis. The diagnosis was confirmed based on the appearance of symptoms and the physical examination of the patients. Functional tests of the liver (ALT, AST, Bilirubin, Amylase, Alkaline) were performed, the bleeding time was checked, and intravenous imaging of the bile duct was performed in persons suspected of having biliary colic.

After confirming the diagnosis with ERCP, the sample was divided into two groups to facilitate the study. The first group: patients suffering from gallstones. The second group: patients without cholelithiasis.

The upper limits of normal values for each of the liver function tests were set as high values, and these values were compared with stone size in both groups. We considered that ALP and AST are qualitative variables, compared the level and values of ALT in both groups, and considered the values higher than normal values as high and abnormal.

Statistical Analysis

The patient data of age, gender, and the previously mentioned hypotheses with the measured stone size from imaging were entered into the SPSS 16.0 software as qualitative variables. All values less than 0.2 were assumed as significant results.

Results and Discussion

During the study, which included 140 patients, the average age was between 60 to 90 years of both sexes (male and female). As shown in **Table 1**, there were no indications in the patients with the values of the ALP and AST liver tests, nor even the number of patients



suffering from the level of ALT in the blood was elevated, and there were no pathological signs of coliform infection in both groups. With the elevation in ALT values as a qualitative variable, we found that a large number of patients in the study groups suffered from elevation (**Table 1**).

Table 1. Comparison of Liver Functional Tests between Patients with and without Cholecystitis

Study variables	patients	With cholecystitis		Without cholecystitis		Total	
		Number	Percent	Number	Percent	Number	Percent
		AST	Normal	10	13,88	61	84,72
	Elevated	12	17,64	55	80,88	68	100
ALT	Normal	10	43,47	13	56,52	23	100
	Elevated	65	55,55	52	44,44	117	100
Bilirubin	Normal	10	43,47	13	56,52	23	100
	Elevated	66	56,41	50	42,73	117	100
ALP	Normal	3	13,04	20	86,95	23	100
	Elevated	21	17,94	96	82,05	117	100

The present study showed that the results of performed tests were not related to the formation of gallstones. Despite the previous belief that there is a limited useful prediction for these tests for the formation of stones (Murphy *et al.*, 2020). Kaldor *et al.* reported that patients with cholecystitis who undergo laparoscopy for cholecystectomy have limited predictability of liver enzymes. His analysis results indicated that the changes in the hepatic enzyme values were sensitive to the diagnosis of stone formation (Kaldor *et al.*, 2006).

Hayat *et al.* presented a study on 207 patients confirming elevated levels of aspartate transporter enzyme in blood serum only in patients with hepatitis (Hayat *et al.*, 2005). Para *et al.* found that any of the studied factors such as liver enzymes and ultrasound alone could not be a suitable indicator of stone formation through a study he conducted on 151 patients who underwent ERCP (Parra *et al.*, 2007). In another study on 78 patients performed by Patel *et al.*, they reported that endosonography before operation can decline unnecessary ERCP procedure (Patel *et al.*, 2017).

In our study, the ALT level was higher in patients with gallstone. We have set several conditions for performing this study, represented by performing tests in one health center and including different age and national groups. In addition, the study only included patients with cholecystitis without mentioning the acute and chronic status.

Conclusion

The study showed that a high level of ALP in the serum indicates a prediction for the presence of stones and that high values of liver

functional tests do not indicate disease. Endosonography as a non-invasive procedure is recommended for patients before ERCP.

Acknowledgments: None

Conflict of interest: None

Financial support: None

Ethics statement: This study followed the ethical criteria recommended by order No.(647n), which was submitted for approval by the Ethics Committee in Research of Moscow City Clinical Hospital (named after V.V. Vinogradov).

References

- Fan, L. L., Chen, B. H., & Dai, Z. J. (2017). The relation between gallstone disease and cardiovascular disease. *Scientific Reports*, 7(1), 1-8. doi:10.1038/s41598-017-15430-5.
- Hayat, J. O., Loew, C. J., Asress, K. N., McIntyre, A. S., & Gorard, D. A. (2005). Contrasting liver function test patterns in obstructive jaundice due to biliary structures and stones. *QJM - Monthly Journal of the Association of Physicians*, 98(1), 35-40. doi:10.1093/qjmed/hci004.
- Jones, M. W., Kashyap, S., & Ferguson, T. (2020). Gallbladder Imaging. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK470366/>
- Kaldor, A., Akopian, G., Recabaren, J., & Alexander, M. (2006). Utility of liver function tests after laparoscopic cholecystectomy. *American Surgeon*, 72(12), 1238-1240. doi:10.1177/000313480607201219.
- Karwa, S. (2017). Role of Magnetic Resonance Cholangiopancreatography in Biliary Disorders. *International Journal of Radiology & Radiation Therapy*, 2(4), 95-99. doi:10.15406/ijrt.2017.02.00032.
- Murphy, M. C., Gibney, B., Gillespie, C., Hynes, J., & Bolster, F. (2020). Gallstones top to toe: what the radiologist needs to know. *In Insights into Imaging*, 11(1), 13. Springer. doi:10.1186/s13244-019-0825-4.
- Patel, R., Ingle, M., Choksi, D., Poddar, P., Pandey, V., & Sawant, P. (2017). Endoscopic ultrasonography can prevent unnecessary diagnostic endoscopic retrograde cholangiopancreatography even in patients with high likelihood of choledocholithiasis and inconclusive ultrasonography: Results of a prospective study. *Clinical Endoscopy*, 50(6), 592-597. doi:10.5946/ce.2017.010.
- Pérez, V. P., Cárdenas, G. V., Benavides, M. A., Roldán, M. V., Tisoc, L. M., Calixto, N. N., Rossell, M. C., & De Rueda, C. M. B. (2007). Choledocolithiasis Predictors in High-Risk Population Subjected to Endoscopic Retrograde Pancreaticholangiography at " Hospital Nacional Arzobispo Loayza". *Revista de gastroenterologia del Peru: organo oficial de la Sociedad de Gastroenterologia del Peru*, 27(2), 161-171.
- Platt, T. E., Smith, K., Sinha, S., Nixon, M., Srinivas, G., Johnson, N., & Andrews, S. (2018). Laparoscopic common bile duct exploration; a preferential pathway for elderly patients.

- Annals of Medicine and Surgery*, 30, 13-17. doi:10.1016/j.amsu.2018.03.044.
- Tang, C. L., & Schlich, T. (2017). Surgical Innovation and the Multiple Meanings of Randomized Controlled Trials: The First RCT on Minimally Invasive Cholecystectomy (1980-2000). *Journal of the History of Medicine and Allied Sciences*, 72(2), 117-141. doi:10.1093/jhmas/jrw027.
- Wong, J. K. L., Campbell, D., Ngo, N. D., Yeung, F., Cheng, G., Tang, C. S. M., Chung, P. H. Y., Tran, N. S., So, M. T., Cherny, S. S., et al. (2016). Genetic study of congenital bile-duct dilatation identifies de novo and inherited variants in functionally related genes. *BMC Medical Genomics*, 9(1), 1-10. doi:10.1186/s12920-016-0236-z.
- Worku, M. G., Enyew, E. F., Desita, Z. T., & Moges, A. M. (2020). Sonographic measurement of normal common bile duct diameter and associated factors at the University of Gondar comprehensive specialized hospital and selected private imaging center in Gondar town, North West Ethiopia. *PLoS ONE*, 15(1), e0227135. doi:10.1371/journal.pone.0227135.