Gall stone analysis post laparoscopic cholecystectomy; A five year experience.

Author's.

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Abstract.

Background.

The diagnosis and treatment of gallstone disease is on the increase in our environment.[1] Most analysis in literature is derived from Western countries. Stones in low- and middle-income countries are still being studied. Laparoscopy is the gold standard for surgical treatment of symptomatic gallstone disease.

Aim.

To analyze gallstones, post laparoscopic cholecystectomy.

Method.

The video telescope confirmed successful access after capno-peritoneum. From laparoscopic cholecystectomies done from January 2018 to January 2023 in five different Centers, stones were retrieved and sent for analysis and data was stored in excel spread sheet. Statistical Package for Social Sciences (SPSS) version 23 was used to analyze the data.

Results.

Out of 85 laparoscopic cholecystectomies performed, 65 (76.5%) Cholesterol stones were seen, 15 (17.6%) were mixed stones while 5 (5.9%) were Bilirubin pigment stones. The pigment stones were seen in sickle cell disease patients.

Conclusion.

Most patent had cholesterol stones. Lowering cholesterol in diet may reduce gallstone formation.

Keywords: Gallstone, analysis, laparoscopic cholecystectomy.

Introduction

Gallstones are described as hard chemical substances that form and develop within the gallbladder following an intricate sequence of events involving bile supersaturation, nucleation and initiation.[2] Formation of gallstones is thought to be initiated by biliary stasis, infection, and/or mucin,[3] while stone enlargement is by accretion.[2] Gallstones occur in approximately 95% of patients with cholecystitis. [4]

It is common practice to analyze the stones following gall bladder removal. The analysis employs various methods: The colorimetry method which measures the amount of calcium, bilirubin, and cholesterol in the stone.[2]

Gallstone composition can be physically examined using Fourier Transform Infrared Spectroscopy (FTIR).[5] Using the Infrared (IR) spectral pattern, gallstones can also be categorized.[2]

When establishing whether a stone is made up of single or several components, such as a cholesterol stone or mixed stone, FTIR is beneficial.

The fatty acid composition of cholesterol and pigment stones is determined by gas-liquid chromatography (GLC). [2]

Method

The video telescope confirmed successful access after achieving capno-peritoneum. Following laparoscopic cholecystectomies done between January 2018 to January 2023 in five different Centers, stones were retrieved and sent for analysis and data was stored in excel spread sheet. SPSS version 23 was used to analyze the data.

Result

Out of 85 laparoscopic cholecystectomies performed, 65 (76.5%) Cholesterol stones were seen, 15 (17.6%) were Mixed stones while 5 (5.9%) were Bilirubin pigment stones. The pigment stones were seen in sickle cell disease patients.

Fig 1. Stone composition Fig 2A. Stones prepared for analysis Fig 2B. Gall bladder and the stone.

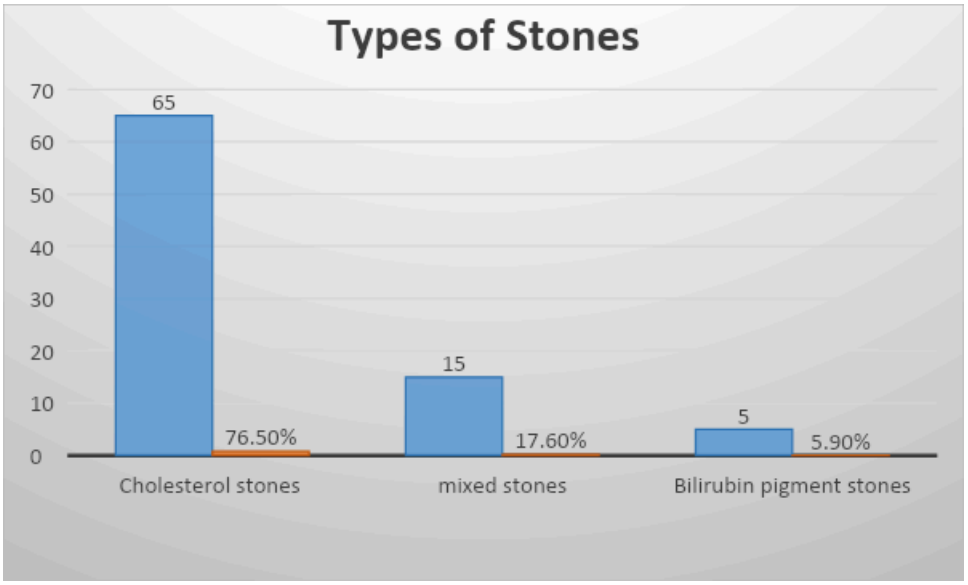

Fig 1. Stone compositions.

Fig 2A. Stones prepared for analysis

2B. Gall bladder and the stone.

Discussion.

Cholecystectomies were done by laparoscopic approach, following which stones were retrieved and sent for chemical analysis. In the index study, most stones were of the cholesterol type.

The causes of gall bladder stones may vary. There are three broad classifications of gallstones to which majority of stones fall under.[6]

Stones whose composition is principally cholesterol; this is the most common type of gall stone.[7] Cholesterol gallstones are not related to cholesterol level in the blood. (Ref) In most cases, they are not visible on computer tomography (CAT) scans but are visible on ultrasound of the abdomen. This makes ultrasound more sensitive in detecting gall bladder stones, which was the case in our study.

Stones predominantly composed of bilirubin; these are termed pigment stones. They occur when red blood cells are destroyed in excess of the usual. The other type of stones are mixed stones.

Gallstones are more common in females, Native Americans and people of Hispanic descent[8,9] but they are currently increasing in our environment as noted in literature.[1] Most patients are over the age of 40, they may be overweight occasionally with a family history of gallstones.[10] Some other factors increase the risk for developing gallstones such as bone marrow or solid organ transplant, diabetes, failure of the gallbladder to empty bile properly (this is more likely to happen during pregnancy), liver cirrhosis and biliary tract infections(pigmented stones).[11] Medical conditions predisposing to gall stone formation may cause large amounts of red blood cells to be destroyed, rapid weight loss from eating low-calorie diet over a sustained period, or following weight loss surgery, prolonged parenteral nutrition and oral contraceptive pills.[12–14] Some of our patients had co-morbidities such as sickle cell disease, diabetes and obesity.

Majority of patients with gallstones are asymptomatic, with gallstones being incidental findings, found at routine ultrasound or abdominal surgery. However, if a large stone blocks the duct draining the gallbladder, patient may experience cramping pain in the middle to right upper abdomen known as biliary colic. The pain subsides if the stone passes into the duodenum through the common bile duct. There may be associated fever and jaundice with progression to cholangitis.[15]

Considering alternative treatment options, oral drugs may be administered in an attempt to dissolve cholesterol gallstones. However, these drugs are hardly effective with stones large enough to cause symptoms and take lengthy periods, on the average, as much as two years, to yield results.[16,17] Shock wave lithotripsy (ESWL) of the gallbladder has also been performed for people in whom surgery may be less preferred. This treatment modality is not used as often as it once was due to high rates of residual stones and recurrence necessitating surgical removal.[18]

In index study, lowering cholesterol level may likely affect the development of gallstones. When stones do occur, causing symptoms, the use of minimally invasive

surgery will play a key role in its treatment. In some giant gall bladder stones, surgery by laparoscopy approach is still preferred in experience hands.[19]

Conclusion.

Most patent had cholesterol stones. Lowering cholesterol in diet may reduce gall bladder stone formation. The application of laparoscopy as the gold standard of surgical treatment for gallstone disease in gaining ground in our setting.

Consent

Informed consent was obtained from the patients for publication of these Cases and accompanying images. A copy of the written consent is available for review by the Editor of this journal.

Competing interests.

The authors declare that they have no competing interests.

Authors' contribution.

POI - conceptualization and study design, data collation, analysis and drafting of manuscript. ID- study design, review and editing. VW- assisted in procedures and data analysis.

All authors have read and agreed to the published version of the manuscript.

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