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MANAGEMENT OF CHOLELITHIASIS

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Abstract:
A survey has shown that in the US, 9% of women and 6% of men have gallstones, many of which are asymptomatic. This rate is higher in developing countries like Pakistan. The chances of developing symptoms or gallstone related complications are 1.5% to 2.5% per year in those patients, in which gallstones were incidentally discovered. Asymptomatic gallbladder stones do not necessarily need immediate attention unless they develop symptoms. Symptomatic patients are referred to the general surgeon. At present, the ideal care of this disease is laparoscopic cholecystectomy, performed as an outpatient. After surgery, follow up is mandatory to ensure that the wounds are healed and patients are facing no further complications.

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INTRODUCTION:

Gallstones or cholelithiasis are hard stone-like deposits on gallstone made up of digestive fluid. Just below the liver, gallstone is present which is a small organ. Digestive fluid or bile is held by gallstone which is released in the small intestine upon the signals received by the organ. A survey has shown that in the US, 9% of women and 6% of men have gallstones, many of which are asymptomatic. This rate is higher in developing countries like Pakistan. The chances of developing symptoms or gallstone related complications are 1.5% to 2.5% per year in those patients, in which gallstones were incidentally discovered. Asymptomatic gallbladder stones do not necessarily need immediate attention unless they develop symptoms.

However, with the follow up of 20 years, it is found that asymptomatic gallstones develop symptoms in this duration (15 to 20 years). More complications can be added by these gallstones like cholangitis, cholecystitis, choledocholithiasis, gallstone pancreatitis, and scarcely cholangiocarcinoma. [1,2,3]

Etiology

The main pathways followed by the gallstone for their formation are:

- **Supersaturation of Cholesterol:** under normal circumstances, the amount of cholesterol excreted by the liver is dissolved by the bile. But, owing to some reasons, if the liver excretes cholesterol in an abnormal ratio, more than bile can digest, then this extra cholesterol may precipitate as crystals. These crystals trap gallbladder mucus and form gallbladder sludge. These crystals grow with time and when stones are formed, these can block the ducts, thus the disease occurs.
- **Surfeit Bilirubin:** when red blood cells are broken down, then a yellow pigment called bilirubin is produced, which is secreted by liver cells into the bile. Under certain circumstances, the liver began to produce surfeit bilirubin by too much processing of breakdown of hemoglobin. The excess of this bilirubin can also become a cause of gallstone formation.
- **Impaired Contractility**: when defects began to rise in the gallbladder, then its function of excretion the bile effectively may also get affected. This condition causes the accumulation of bile in the bladder, leads to concentration and formation of gallstones.

Based on etiology, gallstones have different compositions. The most common types of it include brown pigment gallstones, black pigment gallstones, and cholesterol gallstones. 99% of these are cholesterol gallstones. Each type of stone comes with its unique risk factors.

For instance, some risk factors for the cholesterol gallstone development include age, obesity, female gender, genetics, pregnancy, rapid weight loss, total parenteral nutrition, and certain medications, oral contraceptives, clofibrate, and somatostatin analogs. [4]

Individuals with high hemoglobin turnover, have brown or black pigments. About a total of 2% of these stone types are brown or black-pigmented ones. These pigments are mostly bilirubin. Brown pigments are not common in the US population and are mostly found in the Southeast Asian population. The risk of the development of black stones is higher in patients of ileal diseases, cirrhosis, cystic fibrosis, and sickle cell anemia. Moreover, the risk factors for brown pigment stones include chronic colonization of bile with bacteria and intraductal stasis. [5]

Diseases like Crohn's and Ileum doesn't allow the appropriate reabsorption of bile salts and thus, increases the risk of gallstone occurrence. [6]

PATHOPHYSIOLOGY:

Over and aberrant secretion of cholesterol by liver cells leads to the cholesterol gallstone formation and impaired or hypomotility of the gallbladder emptying process. Other types of gallstone, pigmented, the process is associated with the high heme turnover and bilirubin higher concentration production, more than in normal conditions. The latter may precipitate, crystallize, and eventually forms stones.

Cholelithiasis become problematic, began to show symptoms and complications, when these stones obstruct the cystic duct, bile duct, or both the ducts. There can be temporary obstruction; in this duct dilates, and a stone lodged in the cystic duct returns back to the gallbladder, but this process causes biliary pain which is of short term. This process is known as cholelithiasis.

Persistent pain is owing to persistent obstruction of the cystic duct when a large stone gets stuck in the neck of the gallbladder (permanently). This leads to acute cholecystitis. In some cases, this stone can pass through the cystic duct and enter, get impacted in the common bile duct, where it causes obstruction and

jaundice. This condition is known as choledocholithiasis.

If a gallstone gets dislodged at the ampulla of the distal side of the bile duct after passing through the cystic duct and common bile duct, then acute pancreatitis can occur due to the accumulation of fluid. This accumulation of fluid can exert extreme pressure in the pancreatic ducts and site of activation of pancreatic enzymes. Sometimes, this gallstone can also create a fistula between the small or large bowel and gallbladder walls which leads to obstruction or ileus.

EVALUATION:

Techniques like CBC, CMP, PT, PTT, Alk Phos, amylase, lipase, urine analysis, and total bilirubin are used to initially evaluate gallstones. However, among these all, ultrasound is the best option for diagnosis. A systematic review has revealed its sensitivity of up to 85% and specificity up to 90%. Gallstones appear like hyperechoic layers within the gallbladder on ultrasound imaging. But sludge doesn't cast acoustic shadows. By carefully keeping the following points in mind while diagnosis, then acute cholecystitis can be detected:

- Thickened anterior gallbladder wall, more than 3 mm
- Positive sonographic Murphy's sign or the presence of pericholecystic fluid

Additionally, the increase in measurements of CBD can also aid in the detection of choledocholithiasis. Up to 40 years of age, the normal range of CBD is 4 mm and 1 mm/ decade increase is considered normal. However, in patients with the removed gallbladder, the size of CBD can be 10 mm because it acts as a bile reservoir.

If the ultrasound results show some signs of acute cholecystitis, then to confirm the results, a nuclear medicine cholescintigraphy scan also called HIDA is performed. In a person with a normally functioning gallbladder, a radioactive tracer is injected into the peripheral vein. This vein circulates the tracer to the liver and from there it enters the biliary tree and within 4 hours of injection, it is taken up by the gallbladder. If the cystic duct of the gallbladder is obstructed, then the tracer will not enter the targeted site. The HIDA scan has specificity and sensitivity for acute cholecystitis diagnosis up to 94% and 97%, respectively.

On the other hand, the CT scan does not have as much sensitivity as the HIDA scan. However, it is helpful in the detection of pancreatic inflammation and other complications like mass presence, necrotizing features, pseudocysts, etc, only if CBD dilation is a pre-existing condition. CT scan is also helpful when other causes of abdominal pain are sought out and biliary disease is excluded from RUQ ultrasound.

Additionally, some tests like magnetic retrograde cholangiopancreatography (ERCP/ MRCP) or endoscopy are also used when patients have several conditions like dilated CBD, suspected cholangitis, or jaundice. MRCP is a non-invasive test and doesn't need a crystal dye, while the ERCP is an invasive test and needs a crystal dye which also allows intervention if pathology is present, like stone extraction, biopsy, and stenting.

TREATMENT/ MANAGEMENT:

Management of cholelithiasis is divided into two categories:

- Asymptomatic gallstones
- Symptomatic gallstones

In asymptomatic gallstones, it is important to counsel the patient based upon the visible symptoms and to guide about medical care. If complications are absent, then upon diagnosis of cholelithiasis, it can be treated with oral or parenteral analgesia in the urgent care center. Moreover, dietary recommendations are provided to reduce the chances of recurrent episodes. Physicians can also refer these patients for elective laparoscopic cholecystectomy. At present, laparoscopic cholecystectomy is considered a standard surgery for most of the patients.

On the other, if symptoms are present in patients with acute cholecystitis, then their admittance to the hospital is mandatory with surgical consultation and intravenous antibiotics. Patients with pancreatitis or choledocholithiasis also need admittance to the hospital, gastrointestinal consultation, and ERCP or MRCP. Acute ascending cholangitis usually shows ill-appearing and septic symptoms. These patients often require surgical intervention to drain an infection in the biliary duct along with ICU-level care and aggressive resuscitation. [7,8,9]

For patients with less than 1 cm stone and high cholesterol level, medical treatment with ursodeoxycholic acid is also considered as an option. But this therapy takes a long time of about 9 to 12 months and stone is dissolved in only 50% of the cases. Besides, extracorporeal shockwave lithotripsy is also another option for non-calcified gallstones.

PROGNOSIS AND COMPLICATIONS:

Data has shown that only about 50% of the patients with gallstone develop noticeable symptoms. The mortality rate after laparoscopic cholecystectomy is less than 1%. Due to stones in the bile duct, many complications rises after surgery like incisional hernia, and injury to the duct. Some of the patients even develop post-cholecystectomy pain.

However, common complications associated with cholelithiasis includes the following:

- Pancreatitis
- Bile duct stones
- Acute cholecystitis
- Gallbladder empyema, necrosis
- Gallbladder cancer
- Cholecystoenteric fistula [10, 11]

CONCLUSION:

Cholelithiasis is on a spectrum of biliary disease that occurs in patients with frequent episodes of biliary colic to patients with no symptoms at all. Its diagnosis is associated with the interprofessional group. In the majority of the cases, patients present with upper right quadrant pain and workup reveal the presence of gallstones. Management of this disease entirely depends upon the symptoms in the patients. However, asymptomatic patients are counseled about their diet, weight, exercise, and other activities.

Also, the pharmacist must inform the patients regarding the pros and cons of the medicines and other treatments. Symptomatic patients are referred to the general surgeon. At present, the ideal care of this disease is laparoscopic cholecystectomy, performed as an outpatient. After surgery, follow up is mandatory to ensure that the wounds are healed and patients are facing no further complications.

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