Cholelithiasis

1. What is gallbladder disease?

Gallstone accumulation in the gallbladder is called cholelithiasis. Chole is from the Greek meaning "bile". Lithos is "stone" and iasis is "condition of". Gallstone formation occurs because certain substances in bile are present in concentrations that approach the limits of their solubility. When bile is concentrated in the gallbladder, it can become supersaturated with these substances, which then precipitate from solution as microscopic crystals. The crystals are trapped in gallbladder mucus, producing gallbladder sludge. Over time, the crystals grow, aggregate, and fuse to form macroscopic stones. The two main substances involved in gallstone formation are cholesterol and calcium bilirubinate. Bilirubin, a yellow pigment derived from the breakdown of heme, is actively secreted into bile by liver cells. Most of the bilirubin in bile is in the form of glucuronide conjugates, which are quite water soluble and stable, but a small proportion consists of unconjugated bilirubin. Unconjugated bilirubin, like fatty acids, phosphate, and carbonate form larger masses in the gallbladder and occlude the gallbladder opening during normal contraction. Occlusion of the ducts by sludge and/or stones produces the complications of gallstone disease. The stones become lodged in the bile duct creating hydrostatic pressure on the liver, causing it to make less bile. The bile then accumulates in the common bile duct and gallbladder causing jaundice which gives a yellow coloring to the skin and the whites of the eyes.

Symptoms occur when the gallbladder contracts, often after a meal, resulting in occlusion of the cystic duct with a stone that produces symptoms, typically pain and indigestion like symptoms. The pain can radiate from the right upper quadrant into the mid scapular area with the contractions. Bloating, fatty stools, and flatulence are common symptoms with gallstones. If the gallbladder becomes infected or inflamed, it becomes Cholecystitis and is accompanied by severe pain, fever, nausea, vomiting, fatigue and loss of appetite.

2. What history, PE and lab tests could be used to identify cholelithiasis in DQ?

On PE, patient could present with vague symptoms, such as: indigestion, belching, intolerance to fatty foods, flatulence, n/v or an elevated temperature. DQ will most likely have pain in the upper right quadrant of the abdomen, radiating to the upper back and right shoulder. The pain may be intermittent or steady. If there is liver involvement, DQ could have jaundice, dark urine or clay colored stools.

Some tests that can determine the presence and outlines of stones are:

- Oral cholecystogram – outlines the stones
- Intravenous cholangiography – used to differentiate cholelithiasis from other causes of extrahepatic biliary obstruction if the cholecystogram is negative
- Endoscopic or percutaneous cholangiography – will show flow through the gallbladder
- Transabdominal ultrasound – detects abnormalities in size of organs
3. What non-pharmacologic treatments would you recommend for DQ? Specifically, what dietary, exercise, and other strategies would you recommend for these patients and for patients similar to these members of DQ?

Cholecystectomy (gallbladder removal) is one treatment for cholelithiasis (gallstones), and it is the only option for acute cholecystitis (sudden inflammation of the gallbladder). Sometimes making diet changes can improve the symptoms of gallstones, and surgery may not be necessary. If ultrasound has revealed gallstones but you are asymptomatic, the recommendation is usually “watchful waiting”.

Risk factors for cholecystitis include gallstones (the most common cause of cholecystitis), being female, and increased age. Because gallstones are usually the cause of cholecystitis, the following strategies for preventing gallstones should be followed, especially if you are at increased risk:

- If you are obese or overweight, lose weight. Obesity and overweight are risk factors for gallstones.
- If you need to lose weight, do not lose more than 2 lbs/week. Rapid weight loss can cause gallstones.
- Add fruits, vegetables, and whole grains to your diet. A diet high in fat and low in fiber increases your risk for gallstones.

Exercising 2-3 hours per week, increasing intake of fruits and vegetables and decreasing foods high in sugars and carbohydrates is recommended. The USDA recommends 3-5 servings of vegetables per day and 2-4 servings of fruit. One cup of raw leafy vegetables, ½ cup cooked vegetables, and ¼ cup of vegetable juice are each considered one vegetable serving. Because different types of vegetables contain different vitamins and minerals, it is recommended that you eat a variety of vegetables. One piece of whole fresh fruit, ½ cup of chopped or canned fruit, and ¼ cup fruit juice is each considered one serving of fruit. It is best to eat whole fruits rather than fruit juice as whole fruit is higher in fiber. Only 100% juice can be counted towards the daily recommendation.

4.) What pharmacological treatment would you recommend (if any) for DQ? If you recommend any Rx’s, be specific as to dosages, duration of treatment, potential risks or side effects, and costs of Rx’s for cholelithiasis?

Over the last decade cholelithiasis therapy has shifted away from conventional medication therapy and more towards treatment of gallstones by surgical means. Research has suggested that oral medication in the treatment of gallstones can cause more complications and increased cost because of the length of treatment. The medication of choice for a patient with cholelithiasis is oral bile acid therapy. Only 30% of patients are candidates for the dissolution therapy causing it to be very ineffective for the majority of the population. Some contraindications for therapy include pregnancy, larger gallstones (>1.5 cm) with calcification, obesity, gallbladder inflammation, and common bile duct stones. If patient does qualify for therapy keep in mind that the symptoms recur in most patients within a five year period. Ursodiol (ursodeoxycholic acid) is the preferred medication for therapy because it is the safest common drug. It decreases the amount of cholesterol produced by the liver and absorbed by the intestines. Used in patients who cannot have surgery and to prevent gallstones in overweight patients with excessive rapid weight loss. It can also be used to treat primary biliary cirrhosis. This medication is not used to treat calcified gallstones.
Dose: 13-15 mg/kg/day administered in two to four divided doses with food.
Duration: May have to take for several months and not all gallstones dissolve.
Side Effects: allergic reaction can occur as well as
   ● fever, chills, body aches, flu symptoms
   ● stomach pain, nausea, diarrhea, constipation
   ● dizziness, tired feeling
   ● back pain
   ● runny or stuffy nose, cold symptoms
   ● headache

Cost: Varies depending on weight of patient since dose is reliant on weight based principles. General cost is 50.00 for 30 tablets. With most individuals needing to take medication TID over several months this cost will become more expensive

Chenix (chenodiol) : is another option for medication therapy but used infrequently because major side effects which include hepatotoxicity, increased ALT in ⅓ of patients and intrahepatic cholestasis
For patient DQ, based on current guidelines, it would be recommend to use surgical interventions rather than use medications. Given the effectiveness of laparoscopic cholecystectomy the only patients receiving oral bile acid therapy are those who are non obese with small cholesterol gallstones and a functioning gallbladder. Besides medications being contraindicated in DQ the cost of therapy could run into the thousands of dollars given her weight and may take several months to dissolve.

5. What educational interventions would you recommend for DQ? Be very specific with your recommendations.

As mentioned in question #3, most of the non pharmacological interventions include diet and exercise. They play a major role in preventing gallstones and maintaining a healthy gallbladder. Education regarding diet and exercise for gallbladder symptom control is important for DQ. According to Cornforth, gallstones may be prevented by increasing consumption of both soluble and insoluble fiber which reduces the absorption of deoxycholic acid by producing a favorable shift in the triad of factors that control cholesterol's solubility in bile. Soluble fibers which are effective include guar gum and pectin, as well as other types of fiber such as oat bran, wheat bran, and soy fiber. These fibers are found in many fruits and vegetables. According to Adams, gall bladder disease and gallstones are almost always the result of poor nutrition.

Consuming a lot of soft drinks, sugar products, highly acidic foods like red meat and products made with white flour all contribute to the formation of gallstones. Eating a low fat, low-cholesterol diet helps decrease the risk for gallstones. High fat and high cholesterol diets irritate the bile, causing irritation and inflammation that form stones in the gallbladder. Avoiding fried foods, highly processed foods, whole-milk dairy products and fatty red meats help prevent gallstone formation according to WebMD.com. Substituting with good fats, such as monounsaturated fats like canola and olive oils are easier to break down by bile, according to eHow.com. Another link to decreasing gallstone formation is coffee. Both eHow and Cornforth found that coffee drinking has been associated with a decreased risk of symptomatic gallstones.

As mentioned in question #3, regular, vigorous, exercise may decrease the risk of gallstones. One study, reported by WebMD, found that men who performed endurance activities such as jogging, running, racquet sports, and brisk walking for 30 minutes five times a week, experienced a 34 percent reduction
in risk for gallbladder disease. According to eHow.com, studies show that men who exercise aerobically for 30 minutes a day, 5 days a week had a 34% decreased risk of gallstones. Excess weight results in fluctuations of blood sugar and insulin levels which predisposes a person to develop gallstones, according to eHow.com. Researchers theorize that exercise helps to normalize blood sugar and insulin levels which may contribute to gallstones, if abnormal. Obesity is one of the strongest risk factors for gallstones, however, rapid weight loss diets significantly increase the risk for gallstones. One recommended exercise is Tai Chi.

By following the gentle, pivoting movements of Tai Chi, massaging of the liver, gall bladder, pancreas, and heart takes place since these organs are not fixed in place. Organs move around, and they actually benefit from movement just like massaging a limb, according to Adams.

Another important educational point for DQ is to monitor for inflammation. According to the University of Maryland Medical Center, gallbladder inflammation includes: nausea and vomiting, pain in the upper right right abdomen that is severe and constant, and may last for days. It also increases when drawing a breath, and radiates to the back or right under the shoulder blades. Symptom control for inflammation is important for DQ in order to prevent gallbladder removal.

6. What health promotion strategies would you recommend for DQ?

Hypercholesterolemia, hypertriglyceridemia, diabetes mellitus, obesity and history of cigarette smoking history are associated with increased risk of gallbladder disease. Individuals with the lowest levels of HDL-cholesterol are at highest risk of developing choleliathiasis. Weight loss and exercise are two factors proven to reduce the risk of developing gallbladder disease. A diet low in saturated fats and high in fiber and plant protein is recommended.

**Fat.** Fat tends to get a bad rap, but not all fat is bad. Monounsaturated fats, found in olive oil and canola oil, and omega-3 fatty acids, found in avocados, canola, flaxseed, and fish oil, may lower the risk of developing gallstones. Fish oil may be especially beneficial to people with high levels of triglycerides, as it helps the gallbladder empty. But stay away from saturated fats found in fatty meats, butter, and other animal products, as these fats can increase your likelihood of gallstones and high cholesterol, among other health risks. If you do eat animal products, choose low-fat alternatives — lean chicken instead of red meat, skim milk and low-fat yogurt instead of whole milk.

**Fiber.** Found in whole-grain breads, cereals, and vegetables, fiber in your diet can help you lose weight and may prevent gallstones.

**Fruits and veggies.** There are lots of reasons to eat these wonder foods, and here's one more: Consuming lots of fruits and vegetables may prevent gallstones.

**Nuts.** Peanuts and tree nuts, such as almonds and walnuts, may prevent gallstones. Plus snacking on almonds is a healthy way to ease hunger and help you lose weight.

**Sugar.** Too much sugar in your diet may cause gallstones, so stay away from sweets, and choose low-sugar food alternatives when possible.
**Carbs.** Because carbohydrates are converted into sugar in the body, diets filled with pasta, white bread, and other carbohydrate-rich foods may increase your risk of gallstones.

**Alcohol and coffee.** Studies suggest that moderate consumption of alcohol and coffee may actually prevent gallstones.

**Exercise.** Getting regular exercise can help you keep your weight down, which may prevent gallstones. Thirty minutes, five times a week is all that is needed to make a difference.

For women, hormone replacement therapy and oral contraceptives have been linked to the development of cholelithiasis. Consideration of other pharmaceuticals such as cholesterol lowering medications may need to be taken if a woman is at high risk of developing cholelithiasis.

Studies suggest that maintaining a non-obese body weight, ingesting meals at regular intervals, and high fiber intake could prevent gallstone formation (Tsai, Leitzmann, Willett, & Giovannucci, 2004, 2006). In addition, low consumption of saturated fatty acids and nut consumption is suggested to reduce risk of gallstone disease (Tsai, Leitzmann, Hu, Willett, & Giovannucci, 2004; Tsai, Leitzmann, Willett, & Giovannucci, 2005). Several studies reported that prevalence of gallstone disease is decreased in moderate physical activity compared to those in low levels of physical activity. This result was independent of body mass index (Chuang, Martin, LeGardeur, & Lopez, 2001; Storti et al., 2005).

Because rapid weight loss is associated with risk of cholelithiasis (Ahmed, Cheung, & Keeffe, 2000), DQ needs to consult carefully about the method to lose her weight with her primary care providers. For example, a randomized controlled pilot study reported that high incidence of gallstone formation was associated with rapid weight loss in patients undergoing gastric bypass (Wudel et al., 2002). The most significant way to prevent cholelithiasis would be regular, mild-moderate physical activities with diet. The mechanisms for physical activity as a protective factor for cholelithiasis are not well known. Possible mechanisms would be changes in lipid metabolism in liver and in peripheral organs and changes in gallbladder motility or GI transit time (Chuang et al., 2001). Mild-moderate sport activities rather than leisure and work activities (e.g., sitting, walking, cycling to and from work, school or shopping) might have its protective effect through decrease in levels of biliary cholesterol, which further prevent the formation of cholesterol-supersaturated biles and formation of gallstones (Chuang et al., 2001).

**Sources**


