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A comparison of dietary changes versus elective cholecystectomy in the treatment of gallbladder disease

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A COMPARISON OF DIETARY CHANGES VERSUS ELECTIVE CHOLECYSTECTOMY IN THE TREATMENT OF GALLBLADDER DISEASE

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in

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Liza Ystaas, RN, BSN

PERMISSION

Title: Evidence-based practice for treatment of gallbladder disease in middle-aged, overweight women

Department: Nursing

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Abstract

This literature review was carried out based on a successful completion of an Objective Structured Clinical Examination (OSCE) and oral defense. A case report was analyzed and the topic comparison of dietary changes versus elective cholecystectomy in middle-aged, overweight women with gallbladder disease was formulated. Research was done using PubMed, Cochrane, and CINAHL. Keywords used included “gallbladder disease”, “dietary changes in gallbladder disease”, and “gallbladder disease management”. Publication dates between 2014 and 2020 were added. Recommendations from the International Foundation for Gastrointestinal Disorders (IFFGD), the American Gastroenterological Association (AGA), and the World Gastroenterology Association (WGA) were reviewed.

The literature in these articles and guidelines were consistent with the treatment modalities of gallbladder disease but there are proposals for further research. According to the many studies, most of gallbladder disease cases are asymptomatic and should be viewed as a primary prevention so patients are not needing surgery. Its important health care providers are viewing the risk factors and applying them to the individual’s plan of care in order to prevent symptomatic cholelithiasis and eventually surgery, so early detection of gallbladder disease is vital and ongoing education will only improve patient outcomes.

Background

The gallbladder is a small sac-like structure that is located on the right side of the body just under the liver. The main purpose of the gallbladder is to store bile that is created by the liver until it is needed for digesting fatty foods. When the gallbladder does not function properly, this results in gallbladder disease. In time, gallstones may develop which can lead to a variety of symptoms, ranging from mild to severe.

According to the American Gastroenterological Association (AGA), gallstones are pieces of hard, solid matter that form over time in the gallbladder in some people. They form when some of the bile in the liver turns into crystals (Acalovschi & Lammert, 2020). It is largely unknown exactly why some people have gallbladder disease and others do not; however, there are a variety of risk factors predispose individuals to gallbladder disease. Some of these include: obesity, being female, being older than 40 years old, hormones or medications that result in decreased gallbladder emptying, type 2 diabetes, dyslipidemia, hyperinsulinism, high-calorie diets, and metabolic syndrome (Abraham et al., 2014).

A prospective analysis was performed in 2017 that researched the potential differences in risk factors of gallbladder disease by sex and race (Figueiredo, et al., 2017). Dietary, reproductive, and obesity-related factors in gallbladder disease were also included in the cohort study. Conclusions were made that white postmenopausal women with a BMI greater than 25 who consumer a large amount of red meat and saturated fat/cholesterol are at a significant risk for gallbladder disease. (Figueredo et al., 2017). Of the variety of risk factors, many are modifiable such as obesity and dietary intake. However prevalence is rising due to poor choices in lifestyle by so many Americans.

A World Gastroenterology Organization (WGA) has been tracking a growing global burden of gallbladder disease. Currently, about 20 million people in the U.S (15% of population) have gallstones. (Acalovschi & Lammert, 2020). Within this statistic, only 20% are symptomatic and have complicated stones requiring surgery which then leads to higher costs of medical care. (Acalovschi & Lammert, 2020). In the United States, gallbladder disease is the second most expensive digestive disease and every year about 700,000 cholecystectomies are performed. (Acalovschi & Lammert, 2020). The health care costs of this disease (6.5 billion dollars/year) increased by 20% over the last three decades in the United States alone. (Acalovschi & Lammert, 2020).

This literature review will be incorporating a case report describing an overweight woman in her mid-forties experiencing acute, right sided abdominal pain. She presents to her primary care provider for evaluation and management of this pain. During the visit, she is diagnosed with gallbladder disease and acute cholecystitis. The main emphasis of this literature review will be looking at the evidence-based recommendations for dietary changes in the treatment of gallbladder disease versus elective cholecystectomy.

Case Report

Chief Complaint: 47 year old Caucasian woman presents with right sided abdominal pain

HPI: Marcia Billings started experienced sharp pains on the right side of her abdomen that came on suddenly a couple days ago and is worse after eating. She has had nausea and the pain radiates into her back. The pain is constant and she rates it 8/10. She is otherwise healthy besides being overweight. She admits to drinking 2 glasses of wine per day but has increased her

consumption over the past two days. Denies tobacco use. States her diet is a lot of high fat/greasy foods. She's been taking Ibuprofen for her pain.

Past Medical History: None

Surgical: None

Medications: Ibuprofen as needed

Allergies: None

Social History: She is married, and has two children. No tobacco use. Drinks 2 glasses of wine daily, but recently increased her consumption. She does not get regular exercise. She did receive her flu shot this year.

ROS:

General: low grade fever, denies chills

HEENT: Negative

Cardiac: Denies chest pain, palpitations

Respiratory: Denies shortness of breath

GI: Nausea/vomiting, RUQ abdominal pain that radiates to back, denies diarrhea/constipation

Neuro: Denies headaches, syncope

Physical Examination:

Vitals: Temp: 99.5, BP: 116/70, HR: 102, RR: 20, BMI: 30

General: Alert and oriented, well groomed, slightly anxious, answers questions appropriately

Cardiac: Slight tachycardia, but regular, no murmurs

Respiratory: Lungs clear bilaterally in all lung fields

GI: Bowel sounds normoactive, tender to palpation to both upper and lower right quadrant. Positive Murphy's sign.

Differential Diagnosis: Cholecystitis, Biliary pancreatitis, choledocholithiasis, diverticulitis, acute cholangitis, acute hepatitis, GERD, gastritis, GI ulcer, nephrolithiasis, posterior wall myocardial infarction

Labs/Imaging:

1. CBC, CMP, urine – WBC's slightly elevated, as well as Alk Phos
2. Amylase/Lipase – Amylase slightly elevated
3. Abdominal Ultrasound – thickened gallbladder wall at 4mm, stones present, positive Murphy's sign

Plan: Referral to General Surgeon. This is beyond "watchful waiting" so in meantime, educated on gut rest, avoidance of greasy/fatty foods, alcohol, and ibuprofen intake until appointment with surgery. Zofran will be prescribed as needed for nausea. All questions were answered, patient agreeable with plan of care.

Literature Review

According to the WGA (2020), there are several interventions that are indicated to reduce the risk factors of gallbladder disease. Like many diseases, some of these risk factors are non-modifiable, such as advancing age, female gender, ethnicity, and family history. However, everything else *is* modifiable, dietary intake being one of them. Diets that are high in calories, high in carbohydrates, and low in fiber, are leading to an increased prevalence of gallbladder disease in the United States. (Acalovschi & Lammert, 2020). Of the 20 million people in U.S. with gallbladder disease (Acalovschi & Lammert, 2020), only 4 million will be symptomatic, with a vast number of these 4 million being overweight women over 40 years of age. Although a

cholecystectomy is the treatment of choice in *acute,* symptomatic cholelithiasis, with surgery there is always risk. Again this literature review is focused on exploring the evidence behind dietary changes in gallbladder disease versus the quick fix, a cholecystectomy.

Understanding the gut and the link to gallbladder disease

In the last few years, concrete, scientific evidence has arose supporting the view that dietary patterns are closely linked to the composition and activity of the millions of microbes that reside along the gastrointestinal tract. (Gutierrez-Diaz et al., 2018). As countries have become more industrialized, dietary patterns have been overcome with processed foods that are cheap and easily accessible. This explains the overall alteration in gut bacteria which is increasing the prevalence of certain gastrointestinal disorders, such as gallbladder disease. The activity of the gut microbiota could also be linked to the development of cholelithiaisis, by altering the concentration of biliary lipids in bile, and/or increasing the excretion of bile salts. (Gutierrez-Diaz et al., 2018). According to the 2018 study, after analyzing intake of certain food groups, it was found that a lower intake of vegetables has been found in the group with cholelithiasis. (Gutierrez-Diaz et al., 2018). The protective effect of fruits and vegetables in the formation of gallstones was focused on their content of insoluble fibers, mainly lignin, which alters the turnover of bile salts and cholesterol by means of decreasing the lithogenic effect of the diet. (Gutierrez-Diaz et al., 2018). Based off of research, it has been proven that with the correct intake of fruits, vegetables, and fiber, people can ultimately decrease their risk of acute cholecystitis.

Gallbladder changes triggered by poor diet

In today's world, overweight and obesity are quite characteristic of an ongoing public health problem. However, the long term effects that come out of it can be detrimental, in more

ways than one. Being overweight leads to increased fat accumulation, eventually this fat begins to distribute itself on the major organs, including the liver, kidneys, heart, and pancreas which causes dysfunction in these organs. (Reyes, et al., 2018). When a person consumes too many lipids, a consequence is cholesterol infiltration in the liver. This then forms cholesterol crystals within the biliary tract, which then leads to gallbladder disease and the formation of gallstones. In the gallbladder, a diet with high-lipid content increases the risk for the development of cholesterol stones, and according to several studies, high-cholesterol secretion from the liver is the main cause of bile saturation in obesity. (Reyes et al., 2018). About 80% of gallstones are composed of cholesterol monohydrate crystals which contributes to gallbladder disease and accounts for approximately 95% of biliary tract disorders. (Reyes et al., 2018). In a person with acute cholelithiasis, the stones are generally composed of calcium, bilirubin, salts, or mixed stones. (Reyes et al., 2018). Dietary lifestyle plays a crucial part in the formation of these stones in gallbladder disease.

Healthy food consumption and risk of cholecystectomy

According to the European Journal of Nutrition, "epidemiologic data on whether consumption of fruit and vegetables decreases the risk of gallstone disease is sparse" (Nordenvall, Oskarsson, & Wolk, 2018). However, in a cohort study done in 2010, it was found that there definitely is an association with an adequate consumption of fruits and vegetables and a lower risk for cholecystectomy, especially in women aged 40-60. (Nordenvall, Oskarsson, & Wolk, 2018). This can vary from person to person, based on weight, age, body type, etc. On average, it was found that people had a lower risk of cholecystectomy if 4.1 daily servings of fruits and vegetables were consumed. (Nordenvall, Oskarsson, & Wolk, 2018). Two thirds of this consumption was vegetables and the remaining one third was fruits. Fruits and vegetables have

been proven to play a positive role in gallbladder disease. They are rich in fiber which shortens the intestinal transit. Along with fruits and vegetables, increased intake of legumes and wholemeal bread have also been associated with decreased cholecystectomy risk. (Barre et al., 2017).

Women and gallstone disease

Studies have linked the higher levels of sex hormones in women over 40 years of age is somehow associated with an increased risk of gallstones, however much more research is needed. So far, experimental studies have demonstrated that overexpression of progesterone's receptors may slower the intestinal transit, while clinical studies have shown that women's intestinal transits are slower then men's, which seem to depend on the menstrual cycle. A slow intestinal transit may, in turn, increase the risk of gallbladder disease by stimulating bacterial overgrowth and by increasing the intestinal absorption of cholesterol. (Nordenvall, Oskarsson, & Wolk, 2018).

Managing gallbladder disease

Studies have shown that the majority of risk factors leading to gallbladder dysfunction are potentially manageable. (Di Ciaula & Portincasa, 2018). The disease appears as the expression of systemic unbalances that, besides the classic therapeutic approaches to patients with clinical evidence of symptomatic disease or complications (in which surgery is needed) could be managed with tools focused on primary prevention (changes in diet and lifestyle), and there could be pertinent implications in reducing both prevalence and health costs. (Di Ciaula & Portincasa, 2018). Since the majority of people with gallbladder disease remain asymptomatic throughout most of their life, watchful waiting is definitely recommended. (Di Ciaula & Portincasa, 2018). Obtaining a thorough medical history is crucial when it comes to managing

this disease. It can prevent the patient from developing worsening symptoms and ultimately, surgery. Dietary lifestyle changes is one major intervention in managing and treating gallbladder disease. Dietary models should be focused on lipid metabolism and metabolic pathways which lead to gallstone formation. Patients need to be educated on a low-carbohydrate diet with enriched vegetable proteins, nuts, and vegetable oils with moderate alcohol intake while encouraged adequate physical activity to maintain a healthy body weight. (Di Ciaula & Portincasa, 2018). In a large French cohort, adherence to the Mediterranean diet has also been linked to a significantly lower risk of cholecystectomy. (Barre et al., 2017). According to the World Health Organization, the Mediterranean diet is highly recommended to promote health and prevent chronic health conditions. It consists of a daily consumption of fruits, vegetables, whole grains; a weekly intake of fish, poultry, beans, and eggs; only moderate intake of dairy products; and limited intake of red meat. (www.mayoclinic.org, 2020). It is no doubt that ongoing research is needed to clarify the real usefulness of these potentially innovative tools.

Surgical risk

With the natural history of gallstones continuing to require research, providers must decide whether treatment is needed. Patient may be categorized into different groups, those that are asymptomatic, those that are mildly symptomatic and would benefit from dietary lifestyles changes, and those that symptomatic and complicated, requiring surgery. Those that need surgery can also be divided into two groups; those that have simply biliary colic and those with potential complications. Cholecystectomy, usually laparoscopic, is recommended for most patients with symptomatic gallstones. However, expectant management is also an effective alternative. (Abraham et al., 2014). There are exceptions to expectant management with patients who are experiencing asymptomatic gallstones and should be taken into consideration. These

include: calcification of the gallbladder (high risk gallbladder cancer), hemolytic anemia, gallstones larger than 3cm, the morbidly obese, Native Americans (high risk of gallbladder cancer), and those who are planning on having a transplant (immunosuppression). (Abraham et al., 2014).

According to the University of Rochester Medical Center, another risk of surgery is sphincter of Oddi dysfunction. People are most at risk of this condition if they have had their gallbladder removed, being female, and being middle-aged. This sphincter of Oddi is a muscular valve in the digestive tract that helps move bile from the pancreas into the small intestine. When the sphincter is not working properly, it can spasm and cannot relax. The digestive juices in the gut then back up into the pancreas and into the bile ducts of the liver causing intense pain. (University of Rochester Medical Center, 2020). Another dysfunction includes stiffening and narrowing of this muscular valve. Digestive juices are then not allowed to pass into the small intestine for proper digestion. Treatment includes different medications that patients may need to take indefinitely, along with a very strict dietary regimen. (University of Rochester Medical Center, 2020).

Making changes early

The high prevalence of cholesterol gallstones, the availability of new information about pathogenesis, and the relevant health costs due to the management of gallbladder disease contribute to a growing interest in this condition. (Di Ciaula & Portincasa, 2018). The evidence has pointed to proper dietary habits being an optimal choice in managing gallbladder disease and shaping the gut bacteria in preventing gallstones. Detecting the disease early, and educating the patient efficiently will only produce more positive outcomes. It is important for patients to know

they may be susceptible to gallstones. Making a simple change, such as dietary intake can generally alter the course of the disease allowing an overall improved health and wellness.

Summary Recommendations

- With the high incidence of gallbladder disease just in the United States (20 million people), only 20% of these will become symptomatic.
- Dietary intake in the United States consists of an abundance of processed foods which increases the incidence of gallbladder disease, especially if the person is female and overweight.
- Post-menopausal hormones in middle aged women have played a part in increased risk of symptomatic gallbladder disease, early education is vital.
- High-lipid foods, along with lack of fruits and vegetables correlate to the development of cholesterol gallstones which accounts for 80% of symptomatic gallbladder disease.
- Adequate amounts of fruit and vegetables, along with low-carbohydrate has been found to improve lipid metabolism decreasing the risk of cholecystectomy.

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