

Jessica Anderson
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Diet Instruction: 50g Fat Restricted Diet

Patient Description and Diagnosis: Alex Reschke is an 18-year-old Caucasian female, 5'8", and 218 pounds. She is currently a senior at Mentor High school and a member of the varsity track-and-field team, in which she participates in shot put and discus. The other night, Alex could not sleep. She experienced severe right upper quadrant pain and back pain between the shoulder blades that lasted for hours. Immediately, her parents rushed her to the hospital. After Alex described her symptoms and personal/family health history, the doctor performed an abdominal ultrasound and computerized tomography (CT) scan to analyze and look for signs of gallstones. The scan came back positive for cholelithiasis. Due to the presence of gallstones, the doctor performed a test to check the bile ducts for gallstones. Using a HIDA scan, a dye was used to highlight the bile ducts, determining that a gallstone was blocking the bile duct pathway. Thus, Alex's severe pain was a result of biliary obstruction, in which the gallstone passed from the gallbladder through the cystic duct and lodged itself into the common bile duct. Alex did not show signs of inflammation. Due to her recent diagnosis of symptomatic cholelithiasis, specifically choledocholithiasis (common bile duct stones), as well as her family history of gallbladder cancer, she decided to undergo a cholecystectomy (removal of the gallbladder laproscopically). In about 6-12 weeks, Alex will have undergone surgery. In the meantime, Alex has been asked by her physician to see a Registered Dietitian for instruction on a 50g fat restrictive diet to help relieve her symptoms prior to surgery.

Etiology: Gallstones and biliary tract infections are known to affect 20 million American's each year. Gallstone related diseases are responsible for about 10,000 deaths per year in the United States. Interestingly, only 1 in 3% of the population complains of symptoms during the course of a year, and fewer than half of these people have symptoms that return. Women are at higher risk of developing gallstones than men, occurring in nearly 25% of women in the US by the age of 60 and as many as 50% by the age of 75. Women are at an increased risk due to estrogen, which stimulates the liver to remove more cholesterol from blood and transfer it into bile. Other risk factors associated with cholelithiasis include being overweight or obese, eating a high fat diet, having a family history of gallstones, having diabetes, and much more. Gallstones may cause no signs or symptoms and may last a few minutes to hours. Symptoms which may appear include sudden and rapidly intensifying pain in upper right or center portion of abdomen, back pain between shoulder blades, pain in the upper right shoulder, as well as high fever with chills and possible yellowing of the skin and whites of eyes (Jaundice). When the gallbladder is removed, the liver continues to make enough bile to digest food; however, the bile drips continuously from the liver into the intestine. The causes of the formation of gallstones is still unclear, but it is suggested that such formation may occur due to bile containing too much cholesterol, bile too high in bilirubin or

the gallbladder does not empty correctly. In such abnormal conditions, cholesterol precipitates as gallstones rather than remaining in the solution of bile salts and lecithin in the form of micelles.

Diagnostic Measures: The challenge is diagnosing gallstones is verifying that the abdominal pain is caused by the stones and not other conditions. Ultrasounds and imaging techniques are commonly used in the detection of gallstones. Because gallstones most often do not cause any symptoms, simply finding stones does not necessarily explain a patient's pain. In diagnosing gallstones, disorders should be ruled out, such as if the patient's pain lasts less than 15 minutes, frequently coming and going, or not severe enough to limit activities. Disorders with similar symptoms include IBS and Pancreatitis. In patient's with known gallstones, the doctor can often diagnosis acute cholecystitis based on classic symptoms of constant and severe pain in the upper right quadrant of the abdomen and imaging techniques to confirm the diagnosis. Blood tests can be used to identify abnormalities that may indicate gallstones or complications: bilirubin and enzyme alkaline phosphatase levels elevated, especially in choledocholithiasis; elevated levels of aspartate aminotransferase and alanine when common bile duct stones are present. Additionally, a high white blood cell count is common in many patients with cholecystitis. Imaging and diagnostic techniques for gallstones may include Ultrasonography, Endoscopic Ultrasound, Computed Tomography, Magnetic Resonance Cholangiography, X-rays, HIDA scan (Gallbladder Radionuclide Scan), Virtual Endoscopy, and Endoscopic Retrograde Cholangiopancreatography (ERCP).

Ultrasounds can help in the diagnosis of various conditions: accurately detect stones as small as 2mm in diameter; indicate gangrene when air is present in the gallbladder. In contrast, ultrasounds may not be helpful in the diagnosis of cholecystitis when gallstones are not present in those with symptoms, and may not be helpful in identifying common bile duct stones or imaging the cystic duct. Additionally, X-rays of the abdomen may detect calcified gallstones and gas. An HIDA scan is a nuclear imaging technique that is more sensitive than ultrasound for diagnosing acute cholecystitis and is noninvasive. During this procedure, a tiny amount of radioactive dye is injected intravenously and excreted into the bile. If the dye does not enter the gallbladder, the cystic duct is obstructed, indicating acute cholecystitis. False results are commonly found in alcoholics with liver disease or patients who are fasting or receiving all their nutrition intravenously.

Treatment: Acute pain from gallstones and gallbladder disease is usually treated in the hospital, where diagnostic procedures are performed in ruling out other possible conditions and complications. There are three approaches to gallstone treatment: expectant management ("wait and see"), nonsurgical removal of stones, and surgical removal of gallbladder. For expectant management, a person has no symptoms, the risks of both surgical and nonsurgical treatments for gallstones outweigh the benefits. Those who show no signs of severe pain or complications may be discharged from the hospital with oral antibiotics and pain relievers. Exceptions to this policy are those who show risk for complications for gallstones,

including those at risk of gallbladder cancer, Pima Native Americans, and patients with stones larger than 3cm. Because the presence of gallstones at an early age increases one's risk for gallbladder cancer, young adults who do not have symptoms may be recommended to have their gallbladder removed. When gallstones are present without inflammation, patients have the following options: intravenous painkillers for severe pain, elective gallbladder removal, lithotripsy, and drug therapy. In regards to the presence of common bile duct stones, a laparoscopic cholecystectomy has taken a role in the detection and removal of common bile duct stones. Because the gallbladder is not an essential organ, its removal is one of the most common surgical procedures performed on women. The advantage of surgical treatment over the other methods is its ability to eliminate gallstones and prevent gallbladder cancer. Cholecystectomy may be performed within days to weeks after hospitalization for an acute attack, depending on the severity of the condition. During a laparoscopic cholecystectomy, the surgeon separates the gallbladder from the liver and other areas, and removes it through one of the 3 small incisions made in the abdomen. Often times, patients will need to stay in the hospital overnight.

Although she does not show signs of inflammation, a laparoscopic cholecystectomy was chosen for Alex. This is due to her family history of gallbladder cancer, her age, the severity of her pain, as well as her ethnicity – Caucasian.

Medical Nutrition Therapy: For the next 6-12 weeks, prior to surgery, Alex will follow a 50g fat restrictive diet. Doing so will assist in relieving her symptoms associated with choledocholithiasis.

BMI: kg/m²

$$\begin{aligned} \text{Ht. } 5'8'' &\rightarrow 5' \times 12\text{in/ft} + 8\text{in} = 68\text{in} \times 2.54\text{cm/in} = 172.72\text{cm} \\ &\rightarrow 172.72\text{cm} \times 1\text{m}/100\text{cm} = 1.7272\text{m} \\ &\sim 1.73\text{m} \end{aligned}$$

$$\text{Wt. } 218\text{lbs} \rightarrow 218\text{lbs} \times 1\text{kg}/2.2\text{lb} = 99.09\text{kg}$$

$$\text{BMI} = (99.09\text{kg}) / (1.73\text{m}^2) = 33.1\text{kg/m}^2$$

Alex is classified as obese, according to BMI for children (>95th percentile). Such status of health risk for a classification as obese is associated with further increased risk of disease.

Although Alex is considered obese, weight loss at this time is not of primary focus. The relieving of symptoms due to her recent diagnosis of choledocholithiasis, in preparation for her laparoscopic cholecystectomy, is of greatest concern. Weight maintenance and achievement of proper macronutrient ratios as well as consuming a well-balanced diet high in fiber, various vegetables and fruits as well as nuts, with a decreased intake in sugar, alcoholic beverages and caffeine are recommended to Alex at this time. In regards to fat, it is recommended for Alex to

consume foods containing monounsaturated fats – found in olive and canola oils, as well as omega-3 fatty acids – found in canola, flaxseed and fish oil. Fish oil may be beneficial in regards to Alex's triglyceride levels, because it improves the emptying action of the gallbladder.

The Total Energy Expenditure (TEE) was used in determining Alex's estimated energy needs at rest. With the re-addition of added physical activity, post surgery, an estimation of Alex's energy needs and estimated energy expenditure will need to be reassessed and revised to best fit her overall health and wellness and nutrition goals.

Total Energy Expenditure for Overweight and Obese Females Aged 3 through 18 Years:

$$TEE = 389 - 41.2 \times \text{age} + \text{PA} \times (15.0 \times \text{wt.} + 701.6 \times \text{ht.})$$

PA Factor: 1.24 for active

Wt. = 99.09kg

Ht. = 172.72cm

Age = 18yrs

Prior to Operation, with caution, unless told doctor advises not to participate in sport:

$$\begin{aligned} \rightarrow TEE &= 389 - 41.2 \times 18 + 1.24 \times (15.0 \times 99.09\text{kg} + 701.6 \times 1.7272\text{m}) \\ &= 389 - 741.6 + 1.24 \times (1486.35 + 1211.80352) \\ &= 389 - 741.6 + 1.24 \times (2698.15) \\ &= 389 - 741.6 + 3345.706 \\ &= 2993.106 \text{ Kcal/d} \\ &\sim \underline{3000 - 3100\text{Kcal/d}} \text{ with PA (active PA = 1.24)} \end{aligned}$$

Post Operation/No Activity:

$$\begin{aligned} &\text{No PA Factor (when PA = 1.0)} \\ &= 389 - 741.6 + 2698.15 \\ &= 2354.55 \text{ Kcal/d} \\ &\sim \underline{2350 - 2450 \text{ Kcal/d}} \text{ without PA (sedentary PA = 1.0)} \end{aligned}$$

Using the TEE for overweight and obese females aged 3 to 18 years, prior to operation, Alex requires about 3000Kcal/d with physical activity. If the doctor advises Alex not to participate in track and field for the next couple of weeks, she should consume about 2350 to 2450Kcal/d. This requirement should be followed post operation, when recovering. Prior and when recovering from surgery, it is best for Alex to avoid fatty foods at first and slowly add them back into her diet. It is important for her to consume the right fats – monounsaturated and omega-3's, while avoiding high consumption and foods high in saturated and trans fats as well

as foods that are high in cholesterol. Such foods can cause biliary irritation; thus, resulting in symptoms of discomfort, cramping, and diarrhea.

Below are the calculations for Alex's macronutrient ratio. In order to prevent excessive diarrhea and symptoms related to cholelithiasis, she should follow this ratio daily.

Without physical activity:

Total Kcal: ~2400Kcal/d

Fat: 20% daily Kcal

$$2400\text{kcal/d} \times 1\text{g fat/9kcal} = 266.7\text{g fat} \times .20 = \underline{53.34\text{g fat/d}}$$

Protein: 25% daily Kcal

$$2400\text{kcal/d} \times 1\text{g protein/4kcal} = 600\text{g pro} \times .25 = \underline{150\text{g pro/d}}$$

Carbohydrate: 55% daily Kcal

$$2400\text{Kcal/d} \times 1\text{g carbohydrate/4kcal} = 600\text{ kcal CHO} \times .55 = \underline{330\text{g CHO/d}}$$

As the information above displays, it is advised for Alex to restrict her fat intake to roughly 53g per day. That is, she should consume 20% of her calories from fat sources. Because Alex is an athlete and her body is under stress, her protein needs are increased. Increasing Alex's protein content may assist in controlling symptoms until surgery. Alex's protein needs were calculated to be 150g/d, which makes up about 25% of her daily calories. Lastly, Alex requires 330g of carbohydrate per day, which is 55% of her total daily energy needs.

It is recommended for Alex to consume small and frequent meals, about 5-6 a day. Due to poor absorption of fat, water-soluble form of vitamins A, D, E, and K may be necessary. Such foods include dark leafy green vegetables, carrots, dairy products fortified with vitamin D, sunflower seeds, almonds, as well as olive oil and soybean oil. Post-surgery diarrhea may be managed through increased fiber intake to increase fecal bulk, and patient avoidance of food that may cause diarrhea.

In helping to aid with digestion, it is advised for Alex to eat foods high in fiber. Although this is important, it should be noted to up her total fiber intake slowly. Increasing fiber intake too drastically may result in additional cramping and discomfort. It is also important for Alex to drink plenty of fluids, especially water. Because diarrhea frequently occurs for a few days post-operation, it is important for Alex to stay well hydrated. In addition, fluid helps encourage the passage of waste through the digestive system and helps to soften stools. Because Alex will be eating foods with higher fiber content, constipation may occur. By drinking enough fluids

daily, she will be able to avoid such conditions. It is advised for Alex to drink at least 8 8oz glasses of fluid each day, at least 4 servings of fruits and vegetables, and at least 4 servings of breads or cereals (2 of those servings being whole grain).

During counseling with Alex, it is important to review the macronutrient ratio designed for her specific needs as well as obtaining adequate intake through a well-balanced diet. The patient will be informed on the importance of obtaining her fat intake from monounsaturated and omega-3 sources, increasing fluid intake to at least 8 8oz glasses of water per day, as well as eating a diet rich in fiber. The patient’s 24-hour recall will be reviewed. Additionally, Alex will receive suggestions for improvement in her overall diet, based on the nutritional recommendations determined. She will be educated and given handouts on specific foods to avoid – causing the onset of symptoms, and those to consume as well as foods high in fat-soluble vitamins – A, D, E, and K. Alex will be given a list of food exchanges that she can use to assist her in educating herself on energy contents of specific foods while using it to easily swap out foods for one another throughout the week.

24-Hour Recall With Suggestions: for a 2400Kcal diet

If needed, patient may make meals into smaller, more frequent, meals.

Total: 53g fat

Fat per meal: ~ 12.3g fat

Fat per snack: ~ 8g

Foods Consumed	Suggestions for Improvement
<p>Breakfast: 2 slices of white toast (160kcal; 2g fat) 1T butter (135kcal; 15g fat) 3 eggs (225Kcal; 15g fat) 1tsp hot sauce 8 oz glass 2% milk (120Kcal; 5g fat)</p> <p>Total: 640Kcal and 37g fat</p>	<p>2 whole wheat slices of toast (160 Kcal; 1g fat)</p> <p>1T peanut butter (100Kcal; 8g fat)</p> <p>Scrambled - 2 egg whites and 1 egg (125Kcal; 5g fat) 2T mild salsa (10Kcal; 0g fat) 8 oz skim milk (90Kcal; 1.5g fat)</p> <p>485Kcal and 15.5g fat</p>
<p>Snack: ½ cup Almonds (200Kcal; 16g fat) Banana (60Kcal; 0g fat) 1 cup Greek Vanilla Yogurt, low-fat (120Kcal; 4g fat) 1/3 cup granola (80Kcal; 1g fat)</p> <p>460Kcal and 21g fat</p>	<p><u>Smoothie:</u> 1 ½ cup nonfat vanilla Greek Yogurt (180Kcal; 0g fat) ¼ cup Almonds (100Kcal; 8g fat) Banana (60Kcal; 0g fat) ½ cup special K cereal (80Kcal; 1g fat) ½ cup Strawberries (60Kcal; 0g fat)</p> <p>420Kcal and 9g fat</p>

<p>Lunch:</p> <p>2 slices white bread (160Kcal; 2g fat) 1T mayonnaise (135Kcal; 15g fat) 2 slices provolone cheese (200Kcal; 16g fat) 2oz luncheon meat – ham (200Kcal; 16g fat) 2 leafs of lettuce – romaine (0Kcal; 0gfat) ½ cup diced pineapple (60Kcal; 0g fat)</p> <p>755Kcal and 33g fat</p>	<p>2 slices whole wheat bread (160Kcal; 2g fat) 1 slice skim American cheese (55Kcal; 3g fat) 2oz grilled chicken breast (110Kcal; 6g fat) 2 leafs of lettuce (0Kcal; 0g fat)</p> <p>½ cup diced pineapple (60Kcal; 0g fat) ½ cup steamed broccoli (25Kcal; 0g fat) 8 oz glass skim milk (90Kcal; 1.5g fat)</p> <p>500Kcal and 12.5g fat</p>
<p>Dinner:</p> <p>1 ½ cup bow-tie pasta (240Kcal; 3gfat) 2 1oz beef meatballs (200Kcal; 16g fat) ¾ cup marinara (95Kcal; 0g fat) 1 oz parmesan cheese – regular (100Kcal; 8g fat) 2 breadsticks (160Kcal; 2g fat)</p> <p>8 oz glass 2% milk (120Kcal; 5g fat)</p> <p>915 Kcal and 34g fat</p>	<p>1 cup whole wheat pasta (160kcal; 2g fat) 2oz grilled chicken breast (110Kcal; 6g fat) ½ cup asparagus – steamed (25Kcal; 0g fat) 1 oz red. Fat Kraft parmesan cheese (55kcal; 3g fat) 1 breadstick (80Kcal; 1g fat)</p> <p>8 oz glass skim milk (90Kcal; 1.5g fat)</p> <p>520Kcal and 13.5g fat</p>
<p>Snack:</p> <p>1 oz plain cream cheese (100Kcal; 8g fat) 1 plain bagel (160Kcal; 2g fat)</p> <p>260Kcal and 10g fat</p>	<p>Snack:</p> <p>1oz low fat cream cheese (55Kcal; 3g fat) 1 whole wheat bagel – 2halves (160Kcal; 1g fat) 2Tbsp Jelly (60Kcal; 0g fat)</p> <p>Snack:</p> <p>½ cup blueberries (60Kcal; 0g fat) ½ cup raspberries (60Kcal; 0g fat) 1/2 cup special K cereal (80Kcal; 1g fat)</p> <p>Total: 475Kcal and 5g fat</p>
<p>Total Kcal: 3030Kcal Total g fat: 135g</p>	<p>Total Kcal: 2400Kcal Total g fat: 55.5g</p>

Prognosis:

Assessment:

- A: presence of gallstones; choledocholithiasis; cholecystectomy in 6-12 weeks
- B. No biochemical measures
- C. BMI 33kg/m² (categorizing as obese); height 5'8"; weight 218lbs; age 18yrs
- D. 50g fat restrictive diet; high fiber and increased fluid intake; increase consumption of fat-soluble vitamins and protein; obtain fat sources from mainly monounsaturated and omega-3's (avoid saturated and trans fats)

Less than optimal intake of types of fats (NI-5.6.3) R/T food and nutrition knowledge deficit concerning type of fat and choledocholithiasis AEB patient 24-hour recall, frequent consumption of fats that are undesirable for condition, BMI > 30kg/m² (BMI of 33kg/m²), obesity, and family history of gallstones.

Inadequate fiber intake (NI-5.8.5) R/T food- and nutrition related knowledge deficit concerning desirable quantities of fiber AEB patient 24-hour recall, diarrhea, and choledocholithiasis.

Increased nutrient needs of protein, fat-soluble vitamins and fiber (NI-5.1) R/T altered absorption of fat from cholecystectomy and comprise of organs related to GI function AEB diarrhea, choledocholithiasis and patient 24-hour recall.

Intervention:

Provide patient with a 50g fat restrictive diet (20% Kcal/d). Change diet, increasing fluid intake, fiber intake, protein intake, and fat-soluble vitamins. If unable to meet fat-soluble vitamin recommendations, may provide patient with supplement. Instruct patient on importance of increasing fiber intake gradually to avoid digestive discomfort. Instruct patient on methods of obtaining a well-balanced diet, achieving 4 servings of grains/cereals (most whole grains), 4 servings of non-starchy fruits and vegetables and at least 8 8oz glasses of water/fluid per day. Advise patient to keep a daily food-log.

Monitoring and Evaluation:

Provide patient with knowledge of maintaining a food-log. Have patient state foods that they should avoid and consume to see if they have obtained knowledge of the diet.

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