e-ISSN (online): 2986-853X

Sriwijaya Journal of Radiology and Imaging Research (SJRIR)

Journal website: https:// phlox.or.id/index.php/sjrir

Utilization of Biopsy-Guided CT Scan in Diagnosing Liver Cancer: A Case Study

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ARTICLE INFO

Keywords:
CT scan biopsy guide
Case studies
Early diagnosis
Hepatitis B
Liver cancer

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All authors have reviewed and approved the final version of the manuscript.

https://doi.org/10.59345/sjrir/v2i1.119

A B S T R A C T

Introduction: Liver cancer is one of the most common types of cancer in Indonesia and has a high mortality rate. Early diagnosis of liver cancer is very important to increase the patient's chances of recovery. Biopsy-guided CT scan is an effective method for diagnosing liver cancer. **Case presentation:** We report the case of a 55 year old man with a history of chronic hepatitis B who presented with complaints of right upper abdominal pain and weight loss. Physical examination revealed hepatomegaly and ascites. Investigations, including abdominal ultrasound and liver function tests, showed a mass in the liver. CT scan of the abdomen with contrast showed a hypodense mass in the right hepatic lobe. A CT-guided liver biopsy was performed and the histopathological diagnosis was hepatocellular carcinoma (HCC). The patient then underwent partial resection hepatectomy and chemotherapy. **Conclusion:** Biopsy-guided CT scan is a valuable tool for the diagnosis of HCC in patients with chronic hepatitis B.

1. Introduction

Liver cancer, or hepatocellular carcinoma (HCC), is one of the most common and deadly types of cancer in Indonesia. With a new incidence rate reaching 30,000 cases per year and a death rate reaching 20,000 cases per year, HCC is a significant public health threat. The main risk factor for HCC is chronic hepatitis B, which infects more than 22 million people in Indonesia. Early diagnosis of HCC is very important to increase the patient's chances of recovery. In its early stages, HCC is often asymptomatic, so diagnosis is often delayed until later stages when treatment becomes more difficult and mortality rates are higher. Apart from chronic hepatitis B, several other risk factors can increase the risk of developing HCC. Chronic hepatitis C virus infection can cause liver inflammation and increase the risk of HCC. Cirrhosis of the liver is a condition in which liver tissue becomes damaged and scarred. Liver cirrhosis can be caused by a variety of factors, including hepatitis B and C, excessive alcohol consumption, and non-alcoholic fatty liver disease. Non-alcoholic fatty liver disease (NAFLD) is a condition where there is a buildup of fat in the liver that is not caused by alcohol consumption. NAFLD can progress to liver cirrhosis and increase the risk of HCC. Aflatoxins are toxins produced by molds that grow on contaminated nuts and seeds. Aflatoxin exposure may increase the risk of HCC. Obesity increases the risk of NAFLD and liver cirrhosis, which in turn may increase the risk of HCC. Diabetes increases the risk of NAFLD

and liver cirrhosis, which in turn may increase the risk of HCC. People with a family history of HCC have a higher risk of developing the disease.[1-3]

Early diagnosis of HCC is crucial to increase the patient's chances of recovery. In its early stages, HCC often has no symptoms, so diagnosis is often delayed until later stages when treatment becomes more difficult and mortality rates are higher. Biopsy-guided CT scan has become an effective and efficient method of HCC diagnosis. This technique combines CT scan technology to guide a biopsy needle into the liver mass to collect a tissue sample, which is then analyzed under a microscope to detect cancer. Compared with other liver biopsy methods, such as ultrasound guided biopsy, CT scan guided biopsy offers significant advantages. CT scans produce more detailed and accurate images of the liver than ultrasound, allowing clearer visualization of liver masses, even small, hard-to-reach masses. This increases the likelihood of accurate and adequate tissue sampling for a more definitive diagnosis. Biopsy-guided CT scans are generally safer than biopsy-guided ultrasounds because the risk of complications such as bleeding and infection is lower. This is because CT scans allow better visualization of the vascular structures of the liver, thereby helping to avoid blood vessels when inserting the biopsy needle. A biopsy-guided CT scan can reach liver masses located in areas that are difficult to access with other methods, such as under the diaphragm or behind the portal vein. This allows a more comprehensive diagnosis of HCC, especially in patients with complex liver anatomy.[4-7]

2. Case Presentation

We report the case of a 55 year old man with a history of chronic hepatitis B who presented with complaints of right upper abdominal pain and weight loss for the last 3 months. The patient had no history of other significant medical illnesses. Physical examination revealed hepatomegaly and ascites. Complete laboratory results were normal, except for AST (100 U/L) and ALT (80 U/L) which were slightly elevated. Elevated AST and ALT may indicate liver damage, which is a potential sign of HCC. Liver function tests show increased levels of AFP (alpha-fetoprotein), which is a marker of liver cancer. Elevated AFP may help support the diagnosis of HCC. Blood coagulation results are normal, which is important to ensure the patient is in a stable enough condition to undergo the biopsy procedure. Abdominal ultrasound showed a hypodense mass in the right hepatic lobe. A hypodense mass on ultrasound can indicate the presence of a tumor in the liver.

Abdominal CT scan with contrast showed a 5 cm x 4 cm hypodense mass in the right hepatic lobe with unclear margins and portal vein invasion. A hypodense mass with unclear edges on CT scan may indicate the presence of HCC. Portal vein invasion indicates that the tumor has spread to the blood vessels in the liver, which is a sign of advanced stages of HCC. A CT-guided liver biopsy was then performed to confirm the diagnosis. A liver biopsy involves removing a tissue sample from a liver mass for examination under a microscope. A CT scan is used to guide the biopsy needle precisely into the mass. The histopathological diagnosis from liver biopsy was HCC. The patient then underwent a partial hepatectomy resection, which is surgery to remove the tumor and healthy liver tissue around it. After surgery, patients undergo chemotherapy to help kill any remaining cancer cells and prevent recurrence. The patient is currently in complete remission, meaning there are no remaining signs of cancer. Patients are monitored regularly with blood tests and ultrasound for early detection of recurrence.

3. Discussion

Biopsy-guided CT scan is an effective and efficient method for diagnosing liver cancer (HCC). This technique combines CT scan technology to guide a biopsy needle into the liver mass to collect a tissue sample, which is then analyzed under a microscope to detect cancer. The biopsy-guided CT scan procedure is generally performed on an outpatient basis and takes approximately 30-60 minutes. Before undergoing a biopsy-guided CT scan, patients consult with a doctor to discuss the procedure, risks, and benefits. The doctor reviews the patient's medical history, drug allergies, and medications currently being consumed. Doctors ask patients to undergo blood tests and other

examinations to ensure the patient is in stable enough condition to undergo the procedure. Patients are asked to fast several hours before the procedure to avoid nausea and vomiting. The doctor gives instructions regarding medications that need to be stopped before the procedure, such as blood thinners. Patients are advised to wear comfortable, loose clothing during the procedure. The patient is asked to lie down on the CT scan table. The doctor or radiology technician helps position the patient correctly. The doctor administers a local anesthetic injection to numb the area around the biopsy site. This aims to minimize pain and discomfort during the procedure. Under the guidance of a CT scan, the doctor inserts a biopsy needle into the liver. The biopsy needle is guided precisely into the liver mass to remove a small tissue sample. The doctor uses a biopsy needle to take several tissue samples from the liver mass. The number of samples taken depends on the size and type of mass. Once sufficient tissue samples have been taken, the biopsy needle will be pulled out of the liver. The biopsy wound will be covered with a bandage or plaster. The patient is asked to rest in the waiting room for a few minutes to ensure his condition is stable. Biopsy results are usually available within a few days. The doctor explains the biopsy results to the patient and discusses next steps. Common side effects of a biopsy-guided CT scan include pain at the biopsy site, bruising, and light bleeding. More serious side effects, such as infection and organ damage, are rare. Patients may need to undergo further examinations, such as abdominal ultrasound or blood tests, to monitor their condition.[8-10]

CT scans produce much more detailed and accurate images of the liver than ultrasound. This allows doctors to see liver masses more clearly, even those that are small and difficult to reach. Small liver masses are often not clearly visible on ultrasound, so a CT scan can help detect liver masses missed by ultrasound. The ability of CT scans to accurately detect liver masses is critical in the diagnosis of HCC. An accurate diagnosis allows doctors to determine the stage of cancer and plan appropriate treatment. This can increase the patient's chances of recovery and extend life expectancy. CT scans produce transverse images of the liver, allowing doctors to view liver masses from different angles. This provides a clearer picture of the shape, size, and location of the liver mass. This information is very important to help doctors in diagnosing HCC and determining the stage of cancer. Clearer visualization of liver masses with CT scans also helps doctors to differentiate between HCC and other liver tumors, such as hemangioma and hepatocellular adenoma. This is important to ensure a correct diagnosis and avoid unnecessary treatment.[11-13]

CT scans can reach liver masses located in areas that are difficult to access with other imaging methods, such as under the diaphragm or behind the portal vein. This allows a more comprehensive diagnosis of HCC, especially in patients with complex liver anatomy. The ability of CT scans to reach hard-to-reach masses is essential to confirm the diagnosis of HCC in all patients, regardless of their liver anatomy. This can help increase the patient's chances of recovery and extend life expectancy. A CT scan can provide additional information about a liver mass, such as its density, texture, and relationship to surrounding structures. This information can help doctors determine the stage of cancer and plan appropriate treatment. Additional information about liver masses obtained from CT scans can help doctors predict the potential spread of cancer and determine the most effective treatment options. This can increase the patient's chances of recovery and extend life expectancy. CT scans can be used to guide a liver biopsy, which is a procedure for taking tissue samples from a liver mass for the diagnosis of HCC. A CT scan allows the doctor to guide the biopsy needle precisely into the liver mass, thereby increasing the chances of accurate and adequate tissue sampling for a more definitive diagnosis. Improving the accuracy of liver biopsy with CT scans can help reduce the risk of complications, such as bleeding and infection, and ensure accurate diagnosis of HCC. This can increase the patient's chances of recovery and extend life expectancy. CT scans offer several significant advantages in visualization of liver masses, compared to other imaging methods such as ultrasound. These advantages provide important benefits in the diagnosis

of HCC, including increased accuracy, clearer visualization of the mass, the ability to reach difficult-to-access masses, additional information about the liver mass, and increased accuracy of liver biopsy. CT scan has become a very important diagnostic tool for HCC and helps increase the chances of patient recovery and prolong life expectancy.[14-16]

Biopsy-guided CT scan has become an effective and efficient method of HCC diagnosis. This technique combines CT scan technology to guide a biopsy needle into the liver mass to collect a tissue sample, which is then analyzed under a microscope to detect cancer. One of the main advantages of CT scan guided biopsy over other liver biopsy methods, such as ultrasound guided biopsy, is its higher safety. This is because CT scans allow better visualization of the vascular structures of the liver, thereby helping to avoid blood vessels when inserting the biopsy needle. Bleeding is one of the main complications of liver biopsy. The risk of bleeding is higher with ultrasound guided biopsy because ultrasound cannot clearly visualize the vascular structures of the liver. This can cause the biopsy needle to hit a blood vessel, resulting in bleeding. CT scans, on the other hand, produce detailed transverse images of the liver, allowing doctors to see the liver's vascular structures clearly. This allows the doctor to guide the biopsy needle around the blood vessel, thereby minimizing the risk of bleeding. Infection is another complication that can occur with liver biopsy. The risk of infection is higher with ultrasound guided biopsy because the procedure is performed without clear visual guidance. This can increase the risk of the biopsy needle hitting contaminated structures, resulting in infection. A CT scan, on the other hand, allows the doctor to guide the biopsy needle precisely into the liver mass, thereby minimizing the risk of impinging on surrounding structures. This helps reduce the risk of infection. A biopsy-guided CT scan allows the doctor to precisely place the biopsy needle into the liver mass. This increases the likelihood of accurate and adequate tissue sampling for a more definitive diagnosis. The greater accuracy of biopsy needle placement with CT scans can help reduce the risk of complications, such as bleeding and infection. This is because the biopsy needle is less likely to hit vital structures in the liver. Biopsy-guided CT scans are generally safer than biopsy-guided ultrasounds because the risk of complications such as bleeding and infection is lower. This is because CT scans allow better visualization of the vascular structures of the liver, thereby helping to avoid blood vessels when inserting the biopsy needle. The safety advantages of CT scan-guided biopsy over ultrasound-guided biopsy are important to consider when selecting a liver biopsy method. Biopsy-guided CT scans can help ensure an accurate and safe diagnosis of HCC, thereby increasing the patient's chances of recovery and extending life expectancy.[13-17]

Biopsy-guided CT scan has become an effective and efficient method of HCC diagnosis. This technique combines CT scan technology to guide a biopsy needle into the liver mass to collect a tissue sample, which is then analyzed under a microscope to detect cancer. Although biopsy-guided CT scans are generally safe and well tolerated by patients, like any medical procedure, there are some possible side effects and risks. Pain at the biopsy site is the most common side effect of CT scan guided biopsy. This pain is usually mild and disappears within a few days. Bruising at the biopsy site is also a common side effect. These bruises are usually mild and disappear within a few weeks. Slight bleeding at the biopsy site may occur. This bleeding usually stops on its own and does not require medical treatment. Heavy bleeding is a rare but serious side effect. This bleeding may require a blood transfusion or surgical intervention. Infection at the biopsy site is a rare side effect. This infection is usually treated with antibiotics. Organ damage, such as liver or kidney damage, is a very rare side effect. Damage to this organ usually occurs in patients with underlying medical conditions. The contrast used in CT scans can cause allergic reactions in some patients. Symptoms of an allergic reaction can include itching, rash, and difficulty breathing. CT scans involve exposure to low levels of radiation. The risk of radiation exposure is generally low, but patients with certain medical conditions may need to weigh the risks and benefits of the procedure before undergoing a CT scan. CT scans are not recommended for pregnant women because radiation exposure can harm the fetus. It is important

to discuss all the risks and benefits of a biopsy-guided CT scan with your doctor before undergoing the procedure. The doctor will help the patient understand the risks and benefits of the procedure and take steps to minimize the risks. Patients should inform the doctor about all underlying medical conditions, drug allergies, and medications currently being taken. This information is important to help doctors determine whether a biopsy-guided CT scan is safe for the patient. Patients may need to fast several hours before the procedure to avoid nausea and vomiting. Patients may also need to stop some medications before the procedure. The doctor will advise the patient about specific preparation instructions. Patients should monitor the biopsy site for signs of infection, such as redness, swelling, and pain. Patients should immediately notify their doctor if they experience serious side effects. Biopsy-guided CT scan is a safe and effective method of HCC diagnosis. However, like any medical procedure, there are some possible side effects and risks. It is important to discuss the risks and benefits of a biopsy-guided CT scan with your doctor before undergoing the procedure. The doctor will help the patient understand the risks and benefits of the procedure and take steps to minimize the risks.[17-20]

4. Conclusion

Biopsy-guided CT scan is an effective, accurate, and safe method for diagnosing HCC. This technique offers several advantages over other liver biopsy methods, such as greater accuracy, greater safety, and the ability to reach difficult-to-access masses. Biopsy-guided CT scans are a valuable tool in the diagnosis and management of HCC, and can help improve a patient's chances of cure.

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