

Detection and Characterization of Lung Cancer using CT Scan Technology

Lilik Lestari^{1,*} Susilo Susilo²

¹ Lung Hospital dr. Ario Wirawan, Salatiga, Indonesia

² Physics Department, Semarang State University (UNNES), Indonesia

*Corresponding author. Email: liliklestarispaw@gmail.com

ABSTRACT

Today, lung cancer is one of the deadliest diseases in the world, with an early sign of Lung Nodule. One of the standard procedures to detect it is a radiological examination using Computed Tomography (CT) Scan technology. This study aims to describe the use of CT Scan to detect the presence of lung cancer. This research uses Philips CT Scan 16 Slice Model MX16 Evo2 and Philips CT Scan 128 Slide Model Ingenuity Core 128. The procedure includes the collection of CT Scan tomographic image data and then the reading of the data by a radiologist. Based on the diagnosis, the results found that lung cancer types of adenocarcinoma, squamous, liver metastases, and metastatic brain tumors. The conclusion states that CT Scan is effectively used to detect the presence of lung cancer.

Keywords: CT Scan, Lung Cancer, adenocarcinoma, squamous, liver metastases, and metastatic brain tumors.

1. INTRODUCTION

Lung tumor or cancer is still being the most common tumors in the world [1, 2] and it is one of the most common and deadly diseases [3]. Lung tumor is the growth of abnormal lumps on lung tissue that could be benign or malignant, derived from malignant tumors of primary epithelial tissue in respiratory tract especially bronchus that could invade nearby tissue structures, and potentially spread throughout the body by bloodstream and lymphatic system [4]. In 2014, more than 1.5 million Indonesians died from cancer. In Indonesia, the type of cancer that causes the most death in men is lung cancer, while the type of cancer that causes the most death in women is breast cancer [5].

Lung cancer is the leading cause of cancer death worldwide, and causes more deaths than breast cancer, colon rectal cancer and cervix cancer combined. The US-based National Lung Screening Trial (NLST) demonstrated a triple screening strategy: Annual computed tomography (CT) resulted in a 20% lower mortality from lung cancer than lung cancer screening using chest x-rays among 53,454 patients at risk. high cancer [6]. Lung cancer is one of the leading causes of cancer-related deaths [7]. The incidence of lung cancer has grown rapidly since the early 20th century. Lung

cancer is currently the leading cause of all cancer-related deaths worldwide [8].

The classification of lung cancer is divided into two groups, namely Small Cell Lung Cancer (SCLC) and Non-Small Cell Lung Cancer (NSCLC). NSCLC is divided into two, namely squamous and non-squamous cell carcinomas. The non-squamous carcinoma section consisted of adenocarcinoma, large cell carcinoma and not otherwise specified (NOS). Adenocarcinoma is the most common type in NSCLC [9]. The most common type of non-small cell lung carcinoma is adenocarcinoma, which increases in patients who do not smoke and in younger patients without the typical risk factors, especially in women [10].

CT scans are an imaging technology that can find lung cancer with more sensitivity and at an earlier stage than chest x-ray and sputum cytology [11]. Analysis of lung cancer clinical epidemiological characteristics used CT continues to increase [12]. High-resolution computed tomography technology has undergone rapid development, so that the area of the body to be scanned can be visually seen in a single sequential slice, and the acquisition of slices, thickness represents the normal standard [10]. High-resolution computed tomography can be more sensitive and specific in diagnosing lung

disease than using other lung disease diagnostic tests [13].

CT or CAT-Scan is a medical tool used to display cross-sectional images of the body that are detected using x-rays with the help of a computer. The resulting images allow a radiologist to examine the inside of the patient's body. CT Thoracic scanning is the mainstay of lung cancer imaging based on the further management of tumors. The primary tumor exhibits a broad spectrum of imaging appearances [7].

The advent of low-dose radiation CT Scan Helix was introduced for early detection of lung cancer in the early 1990s. This CT scan has generated a lot of interest, namely many diagnoses of lung nodules and early-stage peripheral lung cancer have been found [14]. At a technical level, dose reduction in low-dose CT is generally achieved by reducing the tube current. To further reduce the dose (ultralow-dose CT), a lower tube voltage is sometimes used [10]. Low-dose chest CT screening for lung cancer has become a standard of care in the United States, and low-dose CT screening for lung cancer can result in a favourable balance of benefit and harms [15].

The results of prior study showed that the CT scan of the thorax in patients with lung tumors was in the right lung [1, 4], lung cancer cell type of non-small cell carcinoma [16], pulmonary adenocarcinoma [17]. Chest CT scan showing a nodule in the left lower lobe with left pleural effusion [18]. Other findings included pleural effusion, nodule, thoracic lymphadenopathy, pleural thickening, and pericardial thickening [19]. This study aims to describe the use of CT Scan to detect the presence of lung cancer in Lung Hospital dr. Ario Wirawan, Salatiga, Central Java, Indonesia.

2. METHODS

We present cases of using chest CT to detect lung cancer in the radiology department of Lung Hospital dr. Ario Wirawan, Salatiga, Central Java, Indonesia. The procedure includes the collection of CT Scan tomographic images were generated using CT Scan 16 Slice Model MX 16 EVO2, and CT Scan 128 Slice Model Ingenuity Core 128. Compared to CT Scan 16 Slice, CT Scan 128 features high-resolution imaging that can display details as small as 0.28mm, with low radiation exposure (low-dose), increased low-contrast detectability, and lower image noise. This is very helpful in the diagnosis of Lung Cancer because it has been equipped with these superior features. The imaging results were assessed by the radiologist. The result data were described qualitatively.

3. RESULT AND DISCUSSION

In this study, a CT scan to diagnose lung cancer, the techniques used are axial, coronal, and sagittal. Contrast and non-contrast techniques are used for contrast techniques. In Case 1, CT Scan window using mediastinum and lung window showed lung carcinoma type is adenocarcinoma. In left using contrast and the right without contrast with the axial section and coronal section technology CT scan. In left picture, it finds Lung mass in the right lung, the shape is round-oval, and pathology anatomy result is Adenocarcinoma. In right picture, it find Lung mass in the left lung, the shape is round oval, and enhancement pasca kontras (Figure 1).

In case 2, lung carcinoma type is squamous carcinoma. Using contrast and without contrast. In left picture, the, it find lung window with lung mass, shape is round-oval in the right lung, and pathology anatomy is squamous. In right picture, it find mediastinum window with lung mass, squamous, and location is upper right lung low (Figure 2).

In case 3, CT scan using contrast and non-contrast axial section, coronal section, sagittal section showed single nodule in liver. In left and right picture, it find single Nodule in Liver, Kidney is normal, Lien is normal, and Aorta is negative calcification (Figure 3).

In case 4, lung carcinoma type is lymphoma malignant non Hodgkin. Using non kontras CT Scan technology, lymphoma malignant metastasis in pleural effusion right lung. In left and right picture, it find Mediastinum Mass with Pleural Effusion and Lymphoma Malignant non Hodgkin (Figure 4).

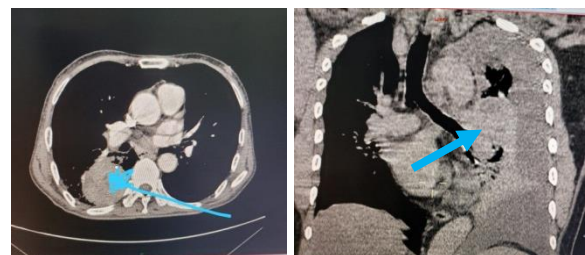


Figure 1. Adenocarcinoma



Figure 2. Squamous

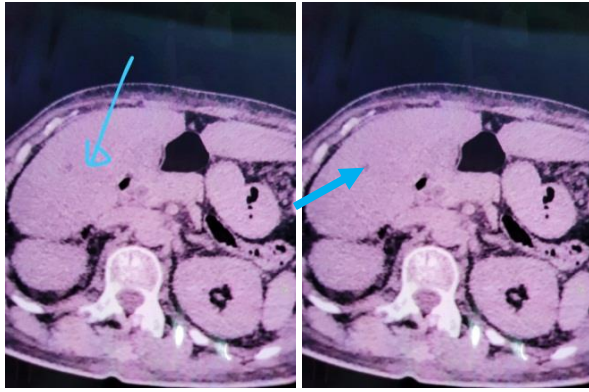


Figure 3. Liver Metastases

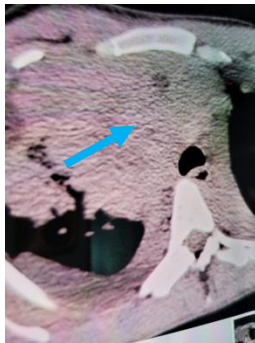


Figure 4. Lymphoma Malignant non-Hodgkin

The types of lung cancer in this case report are adenocarcinoma, small cell lung carcinoma, squamous cell carcinoma, non-Hodgkin lymphoma, and lung carcinoma with metastases in the pleura, heart, and abdomen. The most common lung carcinoma is adenocarcinoma. In this case report, many lung cancer metastases to the pleura in the form of pleural effusion and to the heart, namely pericardial effusion, and nodules in the liver that metastasize to the abdomen. The lung cancer metastases affected are pleural effusion, this indicates that the lung cancer is in an advanced stage or stage 4.

In this case report, there is a type of small cell carcinoma which is an interesting case of lung cancer. Cancer can metastasize to the brain parenchyma. Non-Hodgkin's malignant lymphoma in lung cancer cases occurs in adolescents or adults.

4. CONCLUSIONS

The results of the study showed that 16 slices of CT-Scan and 128 slices of CT-Scan were effectively used to detect the presence of lung cancer. The higher the slice, the better the imaging and the lower the radiation.

AUTHORS' CONTRIBUTIONS

Both authors, L.L and S.S, have contributions about CONCEPT, METHOD, EDITING, and ANALYSIS.

Both authors (L.L and S.S) provided feedback, discussed result and contributed to the final manuscript.

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