Unusual Spread of Extranodal Malignant Lymphoma to the Lung and Nodal to the Mediastinum; How do we know?

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Abstract

Background: Lymphoma is a malignancy that occurs primarily in the lymph nodes. Lymphoma divided into 2 major parts, namely: Non-Hodgkin's Lymphoma (LNH) and Hodgkin's Lymphoma (LH). About 85% of these malignancies are LNH. Epidemiological studies have found that LH is rare in children under 5 years of age and relatively rare in adults, but is the most common cancer among children aged 15-19 years. Computed Tomography Scan(CT-Scan) is the most frequently used examination, because it is effective for diagnosing and showing the stage of Malignant Lymphoma. Lymphoma intrathoracic malignancy usually occurs with a non-specific clinical picture, very often misdiagnosed in some cases in the field.

Method: This study is a descriptive type with a retrospective approach. In 33 patients who underwent thoracic CT scan with contrast which had histopathological proven Malignant Lymphoma. Assess the characteristics of Malignant Lymphoma based on gender, age, intrathoracic location (lungs and mediastinum) and characteristics that will appear on the chest CT scan.

Results: Based on the study, a total sample of 30 patients was obtained, with 23 samples of mediastinal malignant lymphoma patients, and 10 samples of patients with lung malignant lymphoma. The characteristics of the mass in lung lymphoma with spiculated edges, tend to be in the superior lobe, with the most component of the lesion being solid with necrosis with contrast, an increase in attenuation of >24 HU. There are other dominant characteristics, namely the presence of lymph node enlargement elsewhere, presence of nodules in the lungs, pleural effusion and consolidation. In malignant mediastinal lymphoma, the characteristic mass itself is lobulated, with a predominance of a solid component within it and is usually located in the anteromedius mediastinum.

Conclusion: Lung Malignant Lymphoma Patients are predominantly aged 60-69 years and Malignant Lymphoma in the mediastinum is 20-29 years. With 70% of mediastinal malignant lymphoma samples. In the lungs, the dominant lesion is in the form of a mass with an atelectatic component and most of them also describe multiple nodules in the lung with the dominant lesion in the superior lobe, other features: the presence of multiple lymph nodes elsewhere and pleural effusion. In the mediastinum: the most common location is in the anteromedius mediastinum with the most common lesion in the form of a mass, the presence of nodules in the lungs is also found in mediastinal malignant lymphoma.

Keywords: Malignant Lymphoma ; Diagnosis ; CT Scan ; Intrathoracic

1. Main text

Lymphoma is a malignancy that occurs primarily in the lymphnodes. According to the 2020 Global Cancer Statistics, the burden of Lymphoma was exacerbated in many regions, and reached 544,352 incidents and 259,793 deaths in cases of Non-Hodgkin's Lymphoma (LNH) while Hodgkin's Lymphoma (LH) in 2020 reached 83,087 incidents and 23,376 total cases of death, respectively contributing 2.8 and 2.6%, respectively, of the total incidence and mortality of the 36 cancers involved. Lymphoma divided into 2 major parts, namely: Non-Hodgkin's Lymphoma (LNH) and Hodgkin's Lymphoma (LH). About 85% of these malignancies are LNH. Epidemiological studies have found that LH is rare in children under 5 years of age and relatively rare in adults, but is the most common cancer among children aged 15-19 years in the United States (1).In Indonesia, LNH and LH are the sixth

most common. Until now, it is not known why the incidence of this disease continues to increase. Most Lymphomas are found at an advanced stage which is a complication in curative therapy. Disease detection at an early stage is still an important factor in curative therapy even though various types of chemotherapy and radiotherapy are available. Lymphoma intrathoracic malignancy is the main manifestation of mediastinal lymph node disorders. The incidence of LH reaches 80% of cases. Lymphoma intrathoracic malignancy. Pulmonary involvement is detected in 5% of cases of LNH. Extranodal primary thoracic lesions are also frequently found in LNH. Computed Tomography Scan (CT-Scan) is the most frequently used examination, because it is effective for diagnosing and showing the stage of Malignant Lymphoma, although it has drawbacks for identifying Malignant Lymphoma in normal organ conditions. Most of LH is found at an advanced stage which is one of the complications in curative therapy. Discovery of disease at an early stage is an important factor in curative therapy even though various types of therapy are available, both chemotherapy and radiotherapy. Lately, the life expectancy of LH sufferers has increased and even recovered thanks to proper disease management. (2)

With the establishment of a diagnosis of Malignant Lymphoma can direct therapy to be carried out on these patients so that it is expected to improve the quality of life of patients. Lymphoma intrathoracic malignancy usually occurs with a non-specific clinical picture, very often misdiagnosed in some cases in the field. To provide a better understanding of this disease, improve the accuracy of early diagnosis and minimize misdiagnosis, this study will assess the characteristics of chest CT scan in histopathological confirmed patients Lymphoma intrathoracic malignancy

2. Materials and methods

This study was a descriptive type with a retrospective approach on confirmed cases at Dr. Soetomo Hospital, Surabaya, Indonesia. Data were taken from confirmed case's medical record at Dr. Soetomo Hospital from January 2019 to October 2022. We included 33 patients who underwent contrast enhanced chest CT and histopathological proven malignant lymphoma. The CT image was reviewed by 1 radiologist who was not blinded to the clinical data. Each image underwent careful evaluation by CT assessment finding based on age, sex, location (lung and mediastinal) and intrathoracic lesion. We defined Solitary/multiple nodules, masses and mass-like consolidation: defined as well-defined or well-defined rounded opacity with a maximum diameter of 0.5-8 cm. Consolidation :**GGO**: defined as pulmonary opacities that do not obscure the underlying vascular or bronchial margins. a hazy, usually extensive, area of increased pulmonary opacity in which the margins of the pulmonary vessels may not be evident. (2) **Lymphangitis**: Lung lymphoma is known to most often present as a bronchovascular or lymphangitis-like pattern with bronchovascular thickening and interlobular septa as seen in 41% of cases. A lymphnode is considered enlarged if its short axis diameter is 10 mm. When mediastinal lymphadenopathy is indistinguishable, it is defined as a mediastinal conglomerate mass. Vascular invasion includes the superior vena cava, pulmonary artery/vein, and lobar pulmonary arteries but excludes other structures, such as segmental pulmonary arteries, superior and inferior pulmonary veins or cardiac chambers. Pleural involvement Pleural effusion : Hazy homogeneous opacity with a concave upper border, this picture indicates the accumulation of fluid between the two layers of pleura in one / two hemithorax with retained vascular shadow.

3. Results

Based on this study, a total sample of 33 patients was obtained, with 19 male subjects (76.7%) and 14 female subjects (23.3%). In this study, a total of 10 patients with Malignant Lymphoma in the lungs were found, with different locations of the affected lungs. There were 8 (80%) patients with lesions in the superior lobes of the lungs, and 1 (10%) patients each had lesions in the middle and inferior lobes. This study also found 23 samples of patients with malignant lymphoma lesions in the mediastinum. As with the lungs, the location of the lesions in the mediastinum also varies. Of the 23 patients with lesions in the mediastinum, the most common locations were in the anteromedius mediastinum for 13 patients (56.5%), the anterior mediastinum for 6 patients (26.0%), the mediastinum medius for 3 patients (13%), and the mediastinum medioposterior 1 patient (4.5%).

Based on the results of a thoracic CT scan, malignant lymphoma in the thorax, both the lungs and the mediastinum, will give a different picture of the lesion. In this study, the most common description of the lesion in the mediastinum was a mass in 17 patients (74%). The next picture was the KGB conglomerate in 4 patients (17%) but there were also those who gave a picture in the form of multiple KGB in 2 patients (9%). Malignant lymphomas both in the mediastinum and in the lung consist of several components, most of the lesions will consist of solid parts. In this study, 15 patients (65%) had characteristic lesions with only a solid component in them, 1

patient (4%) the lesion component consisted of solid and atelectasis, 4 patients (17%) solid and necrotic, 4 patients (8%) solid with a cystic component

4. Discussion

The youngest intrathoracic lymphoma patient in this study was 13 years old, while the oldest was 73 years old. Most age group 20-29 years as many as 10 samples. Iwasa's research shows that the majority are aged less than 50 years (4). The number of male samples in this study was more than female samples, around 58% of the entire sample. This is in line with the theory that the distribution among males is higher than females with a ratio of males to females of 4:3. (4). According to Sen Wei et.al 2012 Primary pulmonary lymphoma is most often seen between the 5th and 7th decades of life, with a mean age of 50 years and a male-female ratio of 1.07:1. In this study, two locations were taken intrathoracic, namely, the mediastinum and the lung. The most common location in this study was the mediastinum (70%) which was a nodal spread of malignant lymphoma. This is in accordance with the characteristics of Lymphoma which the majority spread nodal (5).

In this study the characteristics that emerged were masses, both single and multiple. There were multiple solid masses scattered in the right and left lung lobes. The components of the mass in this study also varied. Most have a solid appearance with an atelectasis component in it as much as 40%, the other features are a solid only component, and a solid component with necrotic areas in it. The radiographic appearance of malignant lymphoma, especially in the lungs, is not specific, but varies. As reported by Bae et.al. In 2020, the presence of single or multiple masses or nodules with or without areas of consolidation is the main pattern of radiographic abnormalities that can be found. The pattern of CT-scan findings in pulmonary lymphoma consists of solitary or multiple nodules, masses or mass-like consolidations, masses usually 0.5-8 cm in diameter. In a study by Lewis et al., the most common finding with LH was a mass or mass-like consolidation (seen in 80% of cases) whereas the most common finding observed with LNH was peribronchovascular interstitial thickening (seen in 69% of cases). In the research by Shah et.al in 2022 it was also found that masses were the most common in CT-Scan radiological findings.

In this study, the most common lesion location was in the lung, the superior lobe (80%) of all pulmonary lymphomas. Meanwhile, the involvement of both the middle and inferior lobes only accounted for 10% of the entire sample studied. Where masses in lung lymphoma usually have a dominant upper lobe distribution (6) . Elif Tanriverdi et.al in 2016 also mentioned that the radiographic appearance of malignant lymphoma in the lungs varies greatly. There is a dominance of the lower lobe, but in several studies it is also stated that the most common location occurs in the upper lobe.

As can be seen, all samples with Malignant Lymphoma in the lung had features of lymphadenopathy elsewhere. Other nodules outside the main mass were found in patients with pulmonary malignant lymphoma. At least in this study there were 70% of the samples that had multiple nodules outside the main mass. In a study by Diederich et.al., pulmonary nodules were seen in 88% of cases of secondary pulmonary lymphoma. The nodules were multiple in 86% of cases and bilateral in 66% of cases. Pulmonary infiltration is seen in 27% of cases, and more than half of these patients present with multiple nodules. (3)

Although it is found quite often, in this study we only found 40% of the total sample which had a consolidated picture with an air bronchogram in it. The most common radiological appearance of primary LNH, especially pulmonary MALT lymphoma, is an area of opacity with ill-defined borders and an air bronchogram is seen within it. The local areas of consolidation seen in primary low-grade B-cell lymphoma can range from small subsegmental areas to entire lobes, or less commonly, as multifocal and multilobar areas of consolidation (7).

In this study found GGO as much as 30%. According to Bhoomi Angirish et.al 2020 GGO is the most common pattern of presentation of pulmonary lymphoma. The available literature is very limited for this presentation pattern. Tokuyasu et al. reported two cases of Lymphoma presenting as diffuse ground-glass opacities (8). These findings suggest that the pathological mechanism underlying bilateral diffuse GGO on chest CT scan is the spread of lymphoma cells mainly via vascular pathways rather than lymphatic routes, a pattern that is known to occur rarely. These findings suggest that the pathological mechanism underlying bilateral diffuse GGO on chest CT scans is the spread of lymphoma cells mainly via vascular pathways rather than lymphatic pathways, a pattern that is known to occur but is rare (Bhoomi Angirish et.al 2020).

Another feature found is a lymphangitis pattern of 20%. Bhoomi Angirish et.al 2020 mention Lymphoma is known to most often present as a bronchovascular or lymphangitis-like pattern with thickening of the

bronchovascular bundles and interlobular septa as seen in 41% of cases. This finding can be conclusively explained on the basis of the anatomy of the lymphatic system in the lungs. Subpleural nodules were found in as many as 6.7%, Bhoomi Angirish et.al in 2020 stated Lymphoma with pleural involvement is rare and often appears as two subtypes: Primary effusion lymphoma or pyothorax-related lymphoma. Secondary pleural LNH can arise by hematogenous or lymphatic spread or by direct extension of pulmonary or nodal disease.(4)

Pleural effusionin this study there was 50%, pleural effusion associated with Hodgkin's disease is usually the consequence of lymphatic or venous obstruction rather than intrinsic lymphomatous involvement which can present as a mass. Often in or between the chest muscles. Extensive mediastinal lymphadenopathy may result in obstruction of the superior vena cava or compression of the esophagus and main airways. Pleural effusion is a common finding in patients with LNH, with an incidence of 16%-20%. Among them, 60% are responsible for DLBCL Lymphoma. Pleural involvement in lymphoma has a variety of presentations (6).

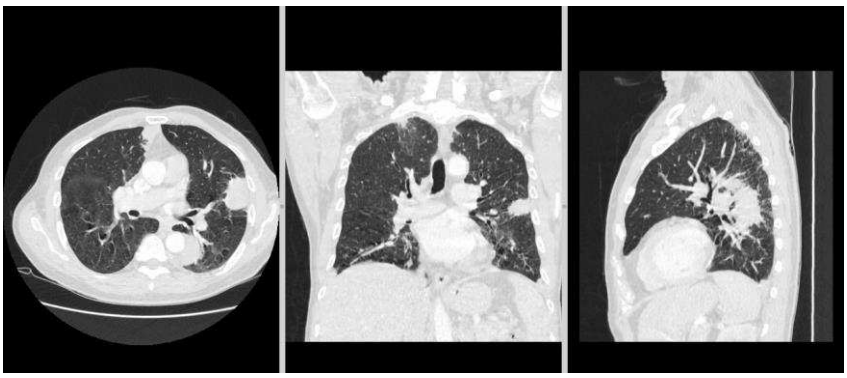

Figure 1. A 67-year-old man with pulmonary LNH on a chest CT scan with contrast, showing a mass in the lung with spiculated edges

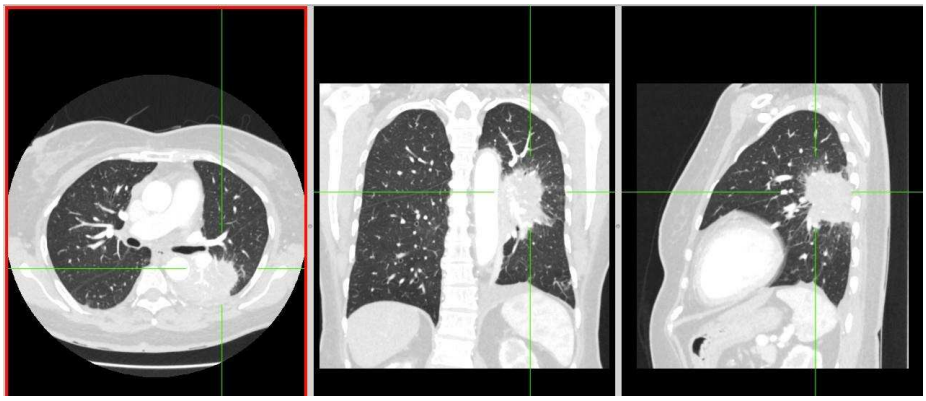

Figure 2. A 36-year-old woman with pulmonary LH on a chest CT scan with contrast, showing a mass in the lung with spiculated edges

Figure 3. A 36-year-old man with pulmonary Hodgkin's Lymphoma, found a lung lesion that extends to soft tissue and destroys the surrounding bone

Figure 4. A 36-year-old man with mediastinal Hodgkin's Lymphoma, found a solid lesion in the mediastinum

Figure 5. A 27-year-old woman with mediastinal Hodgkin's Lymphoma, found a mediastinal lesion that extends into soft tissue to destroy the surrounding bone

5. Conclusion

In the lungs, the dominant lesion is in the form of a mass with an atelectatic component and most of them also describe multiple nodules in the lung with the dominant lesion in the superior lobe, other features: the presence of multiple lymph nodes elsewhere, nodules, and pleural effusion.
In the mediastinum: the most common location is in the anteromedius mediastinum with the most common lesion in the form of a mass, the presence of nodules in the lungs is also found in mediastinal malignant lymphoma

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Conflict of Interests

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