The Characteristic of Secondary Lung Tumours in Medan

Noni Novisari Soeroso[1*], Dina Afiani[1], Setia Putra Tarigan[1], Fidya Qodry[2]

[1]*Department of Pulmonology and Respiratory Medicine, Faculty of Medicine, Universitas Sumatera Utara, Universitas Sumatera Utara Hospital, Jl. Dr Mansyur No. 66 Medan 20154, Sumatera Utara, Medan, Indonesia;* [2]*Faculty of Medicine Universitas Sumatera Utara, Jl. Dr Mansyur No. 5 Medan 20155, Sumatera Utara, Medan, Indonesia*

Competing Interests: The authors have declared that no competing interests exist

Abstract

BACKGROUND: Metastatic malignant neoplasms are the most commonly known as secondary lung tumour. Any cancer could have the ability to spread to the lung. The secondary tumour most typically appears on radiologic findings are multiple nodules pleural effusion, etc.

AIM: To observe the characteristic of secondary lung tumours patients in Haji Adam Malik General Hospital.

MATERIAL AND METHODS: Research design is a cross-sectional with consecutive sampling to 53 patients that are diagnosed with secondary lung tumours. The data was taken from the medical record of secondary lung tumours diagnoses in Haji Adam Malik General Hospital medical record department.

RESULTS: From the study, most cases are found in < 40-year-old age group with a percentage of 34%. The highest secondary lung tumour was ovarian carcinoma (13.2%) and multiple nodules (52.8%) from radiology images. Adenocarcinoma is the most found cytology/histopathology type which is around 69.8%.

CONCLUSION: Female ages < 40 years are the group with the most cases of secondary lung tumours. Primary tumour from the ovarian is the main cause of secondary lung tumour.

Introduction

Cancer is one of the main causes of death in the whole world. According to the data from Cancer Research UK, lung cancer cases reached 46,700 cases in the United Kingdom per year from 2013 – 2015 [1]. Metastatic malignant neoplasms are the most commonly known as secondary lung tumour. Any cancer could have the ability to spread to the lung. The secondary tumour most typically appears on radiologic findings are multiple nodules pleural effusion, etc. From data on hospitalisation, 6,654 patients with cancer had one metastasis reported in their death certificates.

From the total cases of lung cancers, 6,568 or around 38% of them had one metastasis and 3,262 (19%) had two or more metastases. About 68% are younger patients (< 60 years old) and 43% are older patients (> 75 years old) [2], [3].

In a broad understanding, lung cancer is malignancy in the lungs that involves lesions from the lung itself or not from the lung (tumour metastases in lungs) known as secondary lung tumours. Secondary lung tumour is when cancer cells have spread to the lungs from cancer that initially somewhere else in the body and could break away and travel to the blood and or lymphatic system such as the lungs. The symptoms of secondary lung tumours are shortness of breathlessness, cough, pain, etc., some patients did not show any symptoms. Secondary lung tumours are found in metastases of bladder, breast, colon, kidney, melanoma, ovarian, pancreas, prostate, gastric, thyroid gland and cervix cancer [4]. Soft tissue sarcoma is the rarest tumour with only 1% of malignancy. However, 70% of lung metastases etiology is caused by soft tissue sarcoma [5]. Secondary lung cancer is a common form of lung

neoplasms. Moreover, the lungs receive the most secondary tumours from any organs. This is due to the lungs as the only organs to receive all blood and lymphatic flows and with the most-dense capillary tissue in the body.

Therefore, this tissue will receive tumour cells that enter the blood in the vein and through lymphatic channels. Pulmonary metastases usually show images of multiple and bilateral pulmonary nodules, but it can also give an image of a solitary mass. Metastasis tumour nodules to the lungs are shown in every location in intrathoracic, and most commonly in lower lobe [6].

To date, data regarding the characteristic of secondary lung cancer is very limited. The objective of this study is to observe the characteristic of secondary lung tumours in Medan.

Material and Methods

This is a descriptive research design which means that this research describes records, analyses and interprets existing and occurring conditions. The data was taken from medical records in Haji Adam Malik General Hospital. Research subject retrieval was started by case group identification and followed by the review of the medical history to trace the characteristics of secondary lung tumours.

Consecutive sampling technique was used, in which the sample was overall taken from a population of 53 people based on the determined criteria. The criteria are set based on secondary lung tumour patients who have data such as age, gender, family history of cancer, radiology images and cytology/histopathology. Age was classified into < 40, 41 – 50, 51 – 60, and 61 – 69 years old. Radiologic findings were assessed by a radiologist, while cytology/histopathology findings were determined by the pathologist, classified into metastatic lung tumour like squamous cell carcinoma, adenocarcinoma and large cell carcinoma.

Statistical Analysis

This is a descriptive study. Before the research, ethical approval has been obtained from the Health Research Ethical Committee, Faculty of Medicine Universitas Sumatera Utara.

The analysis is meant to describe collected data without any generalisation. Data were then described by particular characteristic and showed in percentage.

Results

Research subjects are patients with lung metastasis of other organs exclude lung malignancy, such as the cervix, gastrointestinal tract, liver, breast, bone, brain, ovarian, testis, thyroid, etc. Overall, the majority of samples are 18 people, 34%, in < 40-year-old age group, mostly females with several 28 people (52.8%). Seven people (13.2%) were observed to have a primary tumour from ovarian, and multiple nodules radiology image is found to be the most common in 28 people (52.8%).

Table 1: Secondary lung tumours data

		n	%
Gender	Male	25	47.2
	Female	28	52.8
Age	< 40 years old	18	34.0
	41-50 years old	9	17.0
	51-60 years old	16	30.2
	61-69 years old	9	17.0
Primary tumours	Cervix	5	9.4
	GIT	6	11.3
	Liver	3	5.7
	Breast	5	9.4
	Bone	6	11.3
	Brain	2	3.8
	Ovarian	7	13.2
	Thyroid	4	7.5
	Testicle	2	3.8
	Others	13	24.5
Radiology	Pleural Effusion	14	26.4
	Infiltrate / Cavity	5	9.4
	Multiple Nodule	28	52.8
	Solitary Nodule	6	11.3
Cancer Type	Adenocarcinoma	37	69.8
	Squamous Cell Carcinoma	8	15.1
	Sarcoma	2	3.8
	Others	6	11.3

Radiology images have different patterns for each of the primary tumours. Multiple nodules radiology patterns were the most found in the primary tumour from gastrointestinal tract, thyroid and bones, also livers (66.7%, 50%, 50%). Pleural effusion is one of the most observed radiology patterns for a primary tumour from the breast (60%) and ovarian (42.8%).

Table 2: Radiologic appearance of secondary lung tumours

Primary Types	Radiology	n	%
Testicle	Multiple Nodule	2	100
Cervix	Infiltrate / Cavity	1	20
	Multiple Nodule	2	40
	Solitary Nodule	2	40
	51-60 years old	16	30.2
	61-69 years old	9	17.0
GIT	Multiple Nodule	4	66.7
	Solitary Nodule	2	33.3
Breast	Pleural Effusion	3	60
	Infiltrate / Cavity	1	20
	Multiple Nodule	1	20
Thyroid	Pleural Effusion	1	25
	Infiltrate / Cavity	1	25
	Multiple Nodule	2	50
Ovarian	Pleural Effusion	3	42.8
	Infiltrate / Cavity	1	14.3
	Multiple Nodule	3	42.8
Bone	Pleural Effusion	2	33.3
	Infiltrate / Cavity	1	16.7
	Multiple Nodule	3	50
Liver	Multiple Nodule	3	100
Brain	Pleural Effusion	1	50
	Multiple Nodule	1	50

Discussion

Patients in the < 40-year-old age group have the highest percentage of secondary lung tumours with a percentage of 34%. A report by RISKESDAS in 2013 stated that the highest prevalence for metastasis is in the over 75 age group (5.0%) whereas the lowest is in children between 1 – 4 years and 5 – 14 years (0.1%). This research shows a different result as there is a rather significant increase in metastasis prevalence in 25 – 34 and 45 – 54 age groups [7].

Based on gender, the female has the highest percentage at 52.8% compared to male (57.2%) for secondary lung cancer. This is different from the research done by Shan (2017), compared to primary lung cancer, secondary lung tumours tend to occur in males (ratio of female: male = 1: 1.72) [8].

Patient's characteristic based on metastases types showed 13.2% ovarian, 11.3% gastrointestinal tract and bone, 9.4% cervix and breast, 7.5%, 5.7% and 3.8% thyroid, liver and testis respectively. The data shows patients with a history of ovarian cancer have the highest percentage of lung metastasis in Haji Adam Malik General Hospital. Based on several kinds of literature stated that lung metastases tend to be from breast cancer, but the number is not mentioned [7].

This, however, does not align with what is found in this study. Radiology characteristic in secondary lung tumour patients is observed the most as multiple nodules at 52.8%. Based on the data in Immanuel Hospital Bandung, the most radiology result observed is pleural effusion [9].

The most common type of cancer found in this research is adenocarcinoma (69.8%). This is aligned with the study done by Shan (2017) in which there were 46.3% patients with adenocarcinoma, as the most found pathology type compared to small cell and large cell carcinoma, squamous cell carcinoma and adenosquamous carcinoma [8]. Based on the most recent study in 2014, adenocarcinoma was the most common histopathology type of lung cancer.

The histopathology image characteristic showed 87.5% of adenocarcinoma case. This is also the same as a result shown in Soeroso et al. study in 2018 that found 92.9% of adenocarcinoma type cases [10], [11].

Primary lung cancer, particularly in woman, was often misdiagnosed as metastatic lung tumour. Soeroso et al. reported a case of tumour of the orbital that firstly diagnosed as a primary orbital tumour by an ophthalmologist but turned out to be metastatic lung cancer into the orbital [12].

This study provides an initial description regarding the characteristic of secondary lung tumour, along with the radiologic and histopathologic findings, particularly in Indonesia. Further study is needed to explore a larger characteristic including the molecular pathway that may be involved in secondary lung tumour.

In conclusion, secondary lung tumour case is most found in < 40-year-old age group and in females. Ovarian primary tumour is the main cause of secondary lung tumour. The most found radiology images of metastases were multiple nodules and pleural effusion. Multiple nodules were most found in testis, gastrointestinal tract (colon/oesophagus), thyroid and bone tumours and pleural effusion were most found in breast and ovarian cancer. While metastasis radiology image of tumours in the liver and testis were only multiple nodules.

References

1. Cancer Research UK in England and Wales. Lung Cancer Statistics. Cancer Research UK, 2016.

2. Kemenkes RI. Buletin jendela dan pusat data informasi kesehatan RI. Jakarta: Kemenkes RI, 2015:20.

3. Djojodibtoro R.D. Respirologi. Jakarta: EGC, 2007.

4. Macmilan Cancer Support England and wales company. Lung metastases cancer. Macmilan Cancer Support, 2015.

5. Depkes RI. Pusat data dan informasi kesehatan RI. Jakarta: Depkes RI, 2015:1.

6. Hail, DH, Cagle, PT, Marchecvsky, AM, Khoor, A, Geisinger, Pugatch, B, et al. Dail and Hamar's Pulmonary Pathology. Metastasis to The Lung. Springer. 3rd ed. 2008; 1:121-124.

7. Davey P. At a Glance Medicine. Jakarta: Erlangga, 2005:202-203.

8. Shan S, She J, Xue ZQ, Su CX, Ren SX, Wu FY. Clinical Characteristic and Survival of Lung Cancer Patients Associated with Multiple Primary Malignancies. Plos One. 2017. [Accessed from http://http://journals.plos.org/plosone/article?id=10.1371/journal.pone.01854 https://doi.org/10.1371/journal.pone.0185485 PMid:28957405 PMCid:PMC5619777

9. Stevanus S. Angka Kejadian Kanker Paru Di Rumah Sakit Immanuel Bandung Periode 1Januari 2009 - 31 Desember 2010. http://repository.maranatha.edu/2386/1.haslightboxThumbnailVersion/0810005_Abstract_TOC.PDF.

10. Soeroso NN, Zain-Hamid R, Sinaga BYM, Sadewa AH, et al. Genetic polymorphism of CYP2A6 and its relationship with nicotine metabolism in male Bataknese smokers suffered from lung cancer in Indonesia. Open Access Maced J Med Sci. 2018; 6(7):1199-1205. https://doi.org/10.3889/oamjms.2018.259 PMid:30087722 PMCid:PMC6062282

11. Soeroso NN, Zain-Hamid R, Sinaga BYM, Sadewa AH, et al. The role of CYP2A6 genetic polymorphism in nicotine dependence and tobacco consumption among Bataknese male smokers. Open Access Maced J Med Sci. 2018; 6(5):864-866. https://doi.org/10.3889/oamjms.2018.224 PMid:29875862 PMCid:PMC5985876

12. Soeroso NN, Tarigan SP, Saragih W, Sari ND. Lung adenocarcinoma presenting with an orbital metastasis. Respir Med Case Rep. 2018; 25:116-118. https://doi.org/10.1016/j.rmcr.2018.08.005 PMid:30112271 PMCid:PMC6091225