

Analysis of Lung Nodules and Lung Cancer Detection by Low-Dose Spiral CT of The Chest During Health Check-Up

Fen Yang¹, Meijuan Ma^{2*}

¹Department of Respiratory and Critical Care Medicine, Shaanxi Provincial People's Hospital (Xixian), Xi'an 710068, Shaanxi Province, China

²Department of Cadre Physical Examination Center, Shaanxi Provincial People's Hospital, Xi'an 710068, Shaanxi Province, China

*Corresponding author: Meijuan Ma, dymameijuan@163.com

Copyright: © 2024 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: *Objective:* To analyze the detection of lung nodules and lung cancer by low-dose spiral computed tomography (CT) of the chest in the population during health checkups. *Methods:* A total of 1,000 cases were selected for the data study and the data were retrospectively analyzed to detect lung nodules. They were divided into groups according to age, gender, and size of nodules, and the detection of lung nodules and lung cancer was compared. *Results:* A total of 268 lung nodules were detected, and the detection rates between genders were not significant ($P > 0.05$). The detection rate of lung nodules increased with age and stabilized after 60 years. When analyzing the size of lung nodules, there were 65 cases of nodules over 8mm. The patients were followed up for 18 months, with 36 cases of visits indicating lung cancer. A total of 10 cases were detected, including 7 cases of adenocarcinoma. *Conclusion:* Low-dose spiral CT chest examination during checkups can detect lung cancer early so that high-risk lung nodules can be dealt with promptly. Underlying lung adenocarcinoma can also be discovered. Individuals more than 40 years of age should regularly conduct low-dose spiral CT chest examinations to detect the presence of lung nodules or lung cancer as early as possible.

Keywords: Health screening population; Low-dose spiral CT chest; Lung nodules; Lung cancer; Detection

Online publication: 2 July, 2024

1. Introduction

Citizens of our country are now actively involved in health checkups and some studies have suggested that recently, there has been a significant increase in the probability of detecting lung nodules. Their incidence has been characterized by a youthfulness of the population in terms of age, which is due to the updating of diagnostic tools and is also related to the fact that doctors actively select high-risk groups for examination^[1,2]. Some literature suggested that lung nodules were predominantly benign and that it was challenging to detect lung cancer in its early or curable stages^[3,4]. After the detection of lung nodules, follow-ups, and treatment plans

should be implemented to help patients develop and promote a significant improvement in their prognosis. In this study, we selected 1,000 cases of health checkups to analyze the detection of lung nodules and lung cancer by low-dose spiral CT examination of the chest.

2. Information and methods

2.1. General information

A total of 1000 cases of health checkups from January 2023 to December 2023 were selected and the information was analyzed retrospectively. There were 625 males and 375 females aged 20–88 years old, with an average of 50.66 ± 6.55 years. Lung nodules were detected and the subjects were divided into groups according to age, sex, and size of the nodules to compare the detection of lung nodules and lung cancer.

2.2. Methods

Information was tracked and the number of people with lung cancer was counted.

2.3. Statistical analysis

Data analysis was carried out using the SPSS 25.0 statistical software. Measurement data were expressed as mean \pm standard deviation and the count data were expressed as %. Measurement data were analyzed using a *t*-test, and count data were analyzed using a chi-squared (χ^2) test. Results were considered statistically significant at $P < 0.05$.

3. Results

A total of 268 cases of lung nodules were detected and the comparison of the detection rate between genders was not significant ($P > 0.05$). There were 171 cases were detected in men and 97 cases in women ($\chi^2 = 0.2664$). The detection rate of lung nodules increases with age, and after 60 years old, it tends to be stabilized. When analyzing the size of lung nodules, 65 cases of nodules more than 8 mm were found, and these patients were followed up for 18 months. The follow-up indicated 36 cases of lung cancer, with a total detection rate of 10 cases, including 7 cases of adenocarcinoma. This information is shown in **Table 1** and **Table 2**.

Table 1. Percentage of lung cancer in each age group with lung nodules of 8 mm and above

Age (years)	Number of lung nodules 8 mm and above	Lung cancer patients	Percentage of lung cancer (%)
Up to 29	1	0	0
30–39	1	0	0
40–49	5	1	20.00
50–59	13	4	30.76
60–69	7	2	28.57
70 and above	9	3	33.33
Total	36	10	27.77

Table 2. Lung cancer detected in patients with lung nodules of 8 mm and above

Gender	Number of lung nodules 8 mm and above	Lung cancer patients
Male	23	6
Female	13	4
Total	36	10

3. Discussion

Lung cancer is a malignant tumor with high morbidity. In the early discovery, patients are not presented with typical symptoms, and the onset of the disease is unpredictable. Hence, the diagnosis of lung cancer is difficult and has a low clinical diagnosis rate, which is not conducive to the follow-up treatment of patients [5]. Early diagnosis of lung cancer has a low specificity, whereby patients have already entered the middle and late stages of the disease upon diagnosis, and the optimal surgical treatment period has passed. Only palliative treatment can be implemented for the patients, which has a more desirable effect, but it does not increase the survival period of the patients, and the patients are still prone to morbidity. However, if the patients are provided with accurate and effective treatments early, their survival can be prolonged. Therefore, screening and diagnostic methods are highly recommended for early-stage lung cancer patients. Clinical practice has confirmed that early detection and intervention of lung cancer can significantly improve the survival rate of patients. Several studies have suggested that the probability of lung cancer screening was significantly higher when low-dose spiral CT of the chest was performed in healthy people compared with ordinary X-ray chest radiography [6,7]. A yearly low-dose spiral CT chest examination, compared with ordinary X-ray chest radiography, will reduce the mortality rate of lung cancer by 20%. Clinical study of chest low-dose spiral CT examination has a high application value. By obtaining the scanning image, the patient's lung nodules can be accurately detected [7,8].

In this study, 268 cases of lung nodules were detected, and the detection rate between genders was not significant ($P > 0.05$). A total of 171 cases were detected in men and 97 cases were detected in women ($\chi^2 = 0.2664$). The detection rate of lung nodules increased with age and stabilized after 60 years of age. When analyzing the size of lung nodules, there were 65 cases of nodules over 8 mm, and these patients were followed up for 18 months. Lung cancer was indicated in 36 cases, with a total detection rate of 10 cases, including 7 cases of adenocarcinoma.

The analysis of the above results confirmed that a spiral CT examination of the chest in the population of health checkups was crucial. The clinical study proposes that after detecting high-risk nodules, patients should be given short-term medication, and if the effect is poor, then surgery should be performed.

Lung cancer is closely related to smoking. As many women smoke, the results of this paper suggested that there was no gender difference. It was proposed that in the case of increasing age, regardless of gender, low-dose spiral CT examination of the chest should be carried out by both. Furthermore, the induction of lung cancer by pollution such as kitchen fumes, second-hand smoke, and haze should not be ignored. Healthcare professionals should implement health promotion and education to help women pay attention to their health problems and avoid the above risk factors. Healthcare workers should also consider the risk factors that women are exposed to during health checkups and implement reasonable programs for them [9].

This study also suggested that the high number of adenocarcinoma cases in lung cancer may be related to the different pathologic types of lung cancer with different developmental characteristics. For example, for small-cell lung cancer, at the time of diagnosis, the proportion of it being in a limited stage is 30%, and 70%

being the extensive stage. Clinically, many small cell lung cancer patients have experienced systemic spread at the time of diagnosis and are given surgical resection, and very few patients are in the limited stage. Based on this, health checkups should properly apply low-dose spiral CT examination of the chest to detect lung cancer as early as possible, and for squamous and small cell lung cancers, it is necessary to find a corresponding method to detect them at an early stage^[10].

4. Conclusion

Low-dose spiral CT chest examination during health checkups can diagnose lung cancer early. High-risk lung nodules can be detected and dealt with promptly, and lung adenocarcinoma can be detected at an early stage. CT chest examination should be actively carried out by both men and women who are 40 years of age.

Disclosure statement

The authors declare no conflict of interest.

References

- [1] Wang ZP, Guo W, Zhen DZ, 2022, Application of Low-Dose Chest CT in The Screening of Lung Nodules and Early Lung Cancer. *Journal of Clinical Radiology*, 41(7): 1298–1302.
- [2] Zhang Q, 2022, Analysis of Lung Examination Results of 19,923 Healthy Medical Check-Ups by Low-Dose Spiral CT. *Imaging Research and Medical Application*, 6(13): 176–178.
- [3] Zou T, Luo Z, Li X, 2021, Application of Low-Dose Multilayer Spiral CT Lung Isolated Solid Nodules in The Early Diagnosis and Treatment of Lung Cancer. *Modern Medical Imaging*, 30(1): 114–116.
- [4] Pei D, Chen S, Li J, 2021, Detection Status of Lung Nodules on 64-row Spiral CT Low-Dose Scanning and Diagnostic Value for Early Lung Cancer. *Journal of Practical Cancer*, 36(6): 973–975 + 980.
- [5] Yin D, 2021, Analysis of the Diagnostic Value of Low-Dose Spiral CT in Lung Cancer Screening of Middle-Aged and Elderly People. *Imaging Research and Medical Application*, 5(7): 165–166.
- [6] Gui G, Chang L, Hu Y, et al., 2022, Analysis of the Value of Serum CEA, Dickkopf-1 Test Combined with Low-Dose Spiral CT Scan in The Early Diagnosis of Lung Cancer. *Chinese Journal of CT and MRI*, 20(1): 67–70.
- [7] Xu SS, 2022, Diagnostic Effect of Multislice Spiral CT Chest Low-Dose Scanning in Lung Nodules. *Imaging Research and Medical Applications*, 6(18): 133–135.
- [8] Fan H, 2022, Diagnostic Value of Multi-Row Spiral CT for Small Lung Nodules and Early Lung Cancer. *China Practical Medicine*, 17(1): 87–89.
- [9] Xie BB, Yang ZY, 2022, Evaluation of the Clinical Value of Multi-Row Spiral CT in Detecting Pulmonary Nodules and Early Lung Cancer. *Imaging Research and Medical Applications*, 6(19): 143–145.
- [10] Feng Q, Zheng S, Jia Y, et al., 2023, The Value of Low-Dose Spiral CT versus Conventional Spiral CT in Lung Cancer Screening in High-Risk Groups. *Imaging Research and Medical Applications*, 7(14): 136–138.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.