Comparative Analysis of Different Radiological Diagnostic Methods in Distinguishing Lung Cancer from Benign Tumors

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Abstract: The paper compares and analyzes the effects of CT and X-ray chest radiographic diagnosis methods in distinguishing benign tumors from lung cancer. Method: The thesis first selects suitable patients with benign tumors and lung cancer from the scope of the hospital. The time is from August 2018 to August 2019. The number of selected patients is 278 patients, and the selected patients are 278 patients. According to grouping conditions, they were divided into experimental group and control group, each with 139 people. The diagnosis rate and imaging performance of the two groups were observed. Results: The diagnosis rate of lung cancer in the experimental group was 96.73%, and that of benign tumors was 97.87%. Compared with the control group's 90.00% and 85.71%, it was significantly better and the diagnosis rate was higher. The difference between the two is very obvious and statistically significant. ($P<0.05$); The performance of the experimental group such as one side of the lung or atelectasis, the presence of burrs or jagged, peripheral solitary nodular lesions, lobular sign or irregular edges were significantly better than those of the control group. The difference between the two is more obvious and statistically significant ($P<0.05$). Conclusion: In terms of diagnosing benign tumors and lung cancer, the effect of CT is more obvious than that of chest X-ray radiology, and the performance of imaging is more comprehensive and detailed. This is a better diagnostic method and should be popularized and promoted in clinical diagnosis.

1. Introduction

Lung cancer is one of the most common malignant tumors in clinical practice, and its morbidity and mortality rate rank first. In the histological classification of lung cancer published by the World Health Organization in 2015, the pathological types were adenocarcinoma (31.5%), squamous cell carcinoma (29.4%), small cell carcinoma (17.8%), large cell carcinoma (9%), and other types were approximately Accounted for 21.6%. The precise diagnosis and pathological classification of lung cancer can help select treatment methods and judge prognosis. Clinical diagnosis of pathological tissue types generally depends on invasive methods such as fiberoptic bronchoscopy, needle biopsy, pleural effusion cytology, postoperative pathological section, etc. However, pathological slices cannot be obtained before surgery, and some patients do not have the conditions for fiberoptic bronchoscopy, needle biopsy, and pleural effusion cytology. Therefore, there is an urgent need for a non-invasive and effective method of diagnosis and classification of lung cancer. Lung cancer is a malignant tumor whose clinical morbidity and mortality rank first among all malignant tumors. If the disease progresses to the middle and advanced stages, the 5-year survival rate is only 10%, while the 5-year survival rate can be improved after the early stage of lung cancer is cured by surgery To 60%. Therefore, early diagnosis and treatment are critical to the prognosis. However, the symptoms of early lung cancer are not obvious, and it is difficult to distinguish between benign tumors, which leads to a certain misdiagnosis rate of clinical missed diagnosis of lung cancer, which can cause serious consequences [1]. Both CT and X-ray chest radiographs are commonly used imaging methods, and there are certain differences between the two in the diagnosis of lung disease. This

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study further analyzed the effects of CT and X-ray chest radiographic diagnosis methods in distinguishing benign tumors from lung cancer. The specific report is as follows.

2. Materials and methods

2.1 General information

First, select suitable patients with benign tumors and lung cancer from our hospital, from August 2018 to August 2019. A total of 278 patients were enrolled, including 156 males and 122 females. Age collection range: 35 years old -70 years old, they were randomly divided into experimental group and control group, with 139 people in each group. The control group was diagnosed by chest X-ray radiography, and the experimental group was diagnosed by CT. Among the 139 patients in the experimental group: 77 males and 62 females; aged 35-70 years, with an average age of (51.62±3.21) years. Among the 139 patients in the control group, there were 79 males and 60 females; the age was 36-70 years, with an average age of (52.63±3.42) years. Inclusion criteria: All research subjects have been diagnosed with benign tumors and lung cancer patients; this study has solicited all research subjects and their families to be informed and both parties signed an informed consent. Exclusion criteria: patients who not only suffer from these two diseases, but also other diseases; patients who cannot effectively participate in the study due to various reasons. The two groups were compared in terms of the number, gender and age of the two groups. There was no significant difference between the two groups and there was no statistical significance. The two groups of patients can be compared and analyzed ($P>0.05$).

2.2 Diagnosis and treatment methods

Patients in the control group and the experimental group received different diagnostic methods. The control group received a chest X-ray. The diagnostic instrument is a medical diagnostic X-ray machine produced by Siemens, and the radiography system is an R-500D R radiography system. Carry out routine chest X-ray examination and maintain 28-32mA during the examination. The voltage is maintained at 60-70kV. The patients in the observation group were diagnosed with CT examination. The diagnostic instrument is Produced by GE, the model of the CT machine is Discovery CT 750HD. CT scans the patient's lung tip to the bottom of the lung. During this process, the patient remains lying flat. After holding your breath, hold your breath and start scanning. This parameter is set as the current is 90-95mA, the voltage is maintained at 150k V, the layer thickness distance is set to 10mm, and the thread pitch is set to 2mm [2].

2.3 Image processing

Perform image analysis and measurement on post-processing workstation AW4.6. Select the arterial phase (70 keV, 1.25 mm) image and load it into the GSI special software for analysis. Two attending physicians and above diagnostic imaging doctors jointly select the image level, measure 3 regions of interest (ROI) of the same size and different levels of the lesion, and take the average value. The area of the ROI is 20-30 mm^2, try to avoid blood vessels, Liquefaction, necrosis and atelectasis components, while keeping the size, shape and position of ROI consistent during measurement. Calculate the calcium content, water content, standardized iodine concentration (NIC), that is, the iodine content of the lesion/the aortic iodine content of the same plane, the effective atomic number, and the proximal slope of the energy spectrum curve. In this study, 40 Kev and 80 Kev are used as reference points: CT (80 keV)-CT (40 keV)/(80-40 keV).

2.4 Observation indicators

Compare the results of CT and X-ray examinations with the clinical pathological results to calculate the diagnosis rate; calculate the sensitivity and specificity, sensitivity = true positive/(true positive + false negative) × 100%, the higher the value, the lower the missed diagnosis rate , Specificity=true negative/(true negative+false positive)×100%, the higher the specificity, the lower

the misdiagnosis rate; the imaging manifestations are atelectasis, burr or jagged, peripheral isolation Nodular lesions, lobular signs or irregular edges, etc.

2.5 Statistical methods

Enter the data obtained from the experimental emergency diagnosis records of the experimental group and the control group into the statistical software SPS S20.0, and use the t test and the chi-square test for the measurement data and count data, respectively, and record the difference of P <0.05 as statistically significant difference [3].

3. Results

3.1 Comparison of diagnosis accuracy between the two groups

The diagnosis rate of lung cancer in the experimental group was 96.73%, and the diagnosis rate of benign tumors was 97.87%. Compared with the control group's 90.00% and 85.71%, it was significantly better and the diagnosis rate was higher. The difference between the two is very obvious and statistically significant (P <0.05). See Table 1.

Table 1 Comparison of the diagnostic accuracy of the two groups of patients [n (%)]

Group	Diagnose lung cancer		Diagnose benign tumors	
	n	Number of diagnoses	*n*	Number of diagnoses
test group	92	89(96.73)	47	46(97.87)
Control group	90	81(90.00)	49	42(85.71)
$\chi 2$	5.69		4.53	
P	0.025		0.032	

Table 2 Comparison of imaging performance between the two groups of patients [n (%)]

Group	test group	Control group	$\chi 2$	P
n	139	139		
One side of the lobe or atelectasis	38(27.33)	35(25.17)	5.43	0.012
Burr or jagged	57(41.00)	47(33.81)	3.87	0.014
Peripheral solitary nodular lesion	31(22.30)	37(26.61)	2.61	0.017
Leaf sign or irregular edges	13(9.3)	20(14.38)	2.13	0.021

3.2 Image analysis of lung cancer and benign tumors

The experimental group and the control group underwent single-factor analysis of variance and single-factor pairwise comparison. There were statistical differences in the arterial phase NIC, calcium (water) content, effective atomic number, and 40-80 keV energy spectrum slope (P < 0.05) See Figure 1 to Figure 3.

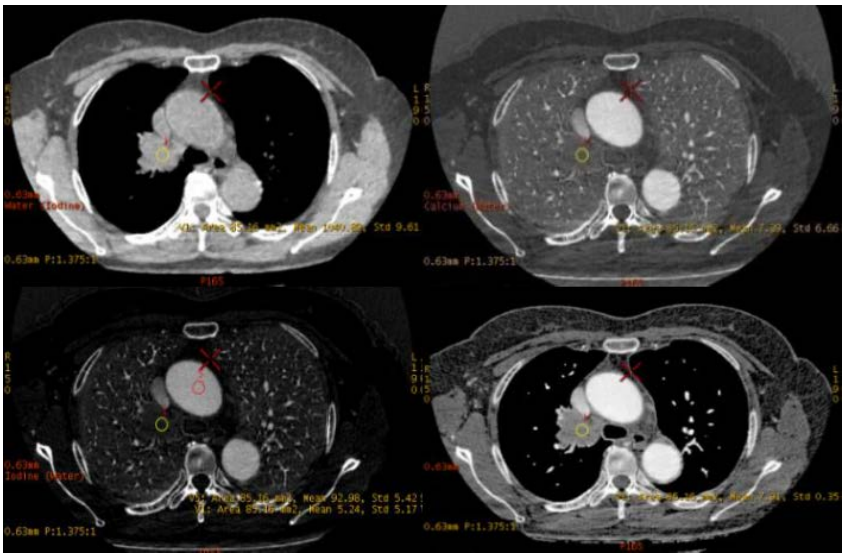

Fig.1 Energy spectrum analysis chart of lung adenocarcinoma of patient A

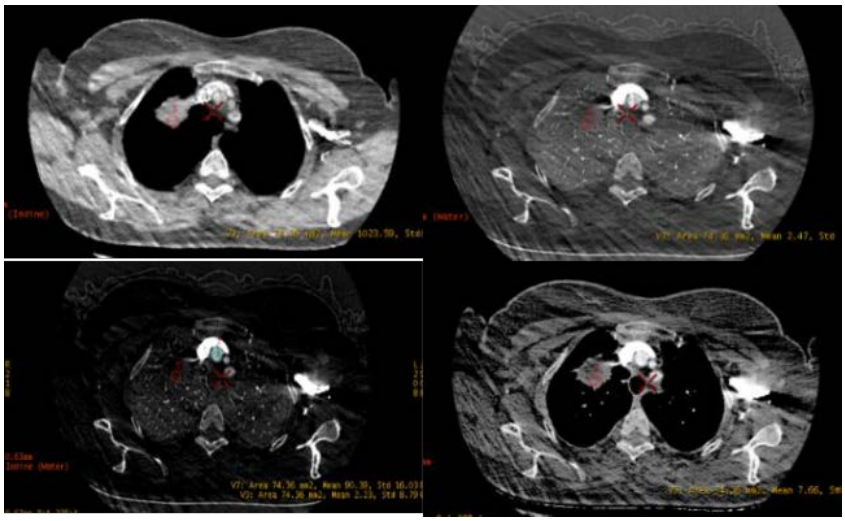

Fig. 2 Energy spectrum analysis chart of lung squamous cell carcinoma of patient B

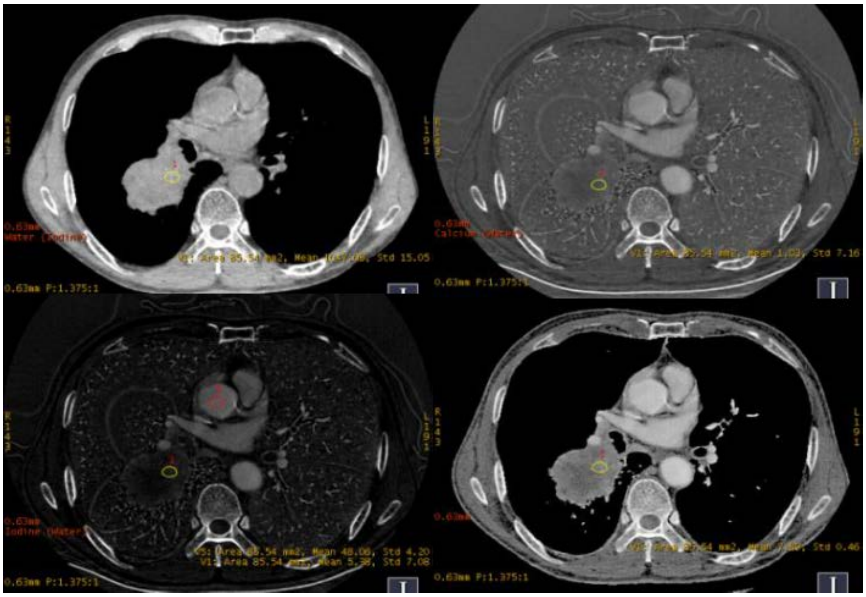

Fig. 3 Energy spectrum analysis chart of large cell lung carcinoma of patient C

4. Discussion

Lung cancer has a high mortality rate, which greatly reduces the quality of life of patients and threatens the safety of patients' lives. Because the clinical manifestations of early-stage lung cancer are not significant, many patients find that they have transformed into the middle-advanced stage when they have cancer, and they have lost the best treatment time. Therefore, strengthening the early detection of lung cancer is very important to increase the survival time of patients. The current mainstream method for lung cancer examination is imaging, and the common methods are X-ray and CT. Chest X-ray is a general inspection method, but its image clarity is insufficient, and the actual missed diagnosis rate and misdiagnosis rate are high. CT detection is very fast, easy to operate, patients are less uncomfortable during the test, and can be widely used [4].

Malignant tumors are angiogenesis-dependent diseases. A large number of immature tumor blood vessels can be generated during the growth of tumors. The core part of lung cancer neovascularization is the proliferation of vascular endothelial cells. Vascular endothelial cell growth factor (VEGF) is the most important factor in inducing the proliferation of endothelial cells. Some scholars have found that VEGF-A is a risk factor for adenocarcinoma, and VEGF-C is a squamous cell. Risk factors for cancer. VEGF-C can be highly expressed in non-small cell lung cancer. Among them, VEGF-A and its corresponding receptor VEGF-2 play a role in lung cancer tumor neovascularization. Some scholars have studied the differences in blood supply between bronchial arteries and pulmonary arteries in non-small cell lung cancer. It can be seen that the blood flow, blood volume, and average transit time of adenocarcinoma are significantly higher than those of lung squamous cell carcinoma and large cell lung cancer. In lung adenocarcinoma, juvenile tumors have more blood vessels than other types of lung cancer. This is consistent with the results of this experiment and literature reports, that is, the iodine content in lung adenocarcinoma is higher than that of the other three groups. Calcification of lung cancer is rare, and most of them are amorphous calcification and diffuse distribution. The calcification of primary bronchial lung cancer can originate from the existing fibrous scar or granulation tissue around, and it can also originate from its internal coagulation and calcium salt deposition after liquid necrosis. Speckled and fine gravel are common forms of calcification in lung cancer. In terms of distribution, the calcification distribution is diffuse or on one side. This experiment shows that the calcium content of lung squamous cell carcinoma is higher than that of other types of lung cancer, which is consistent with the results of the literature. This may be related to the hypercalcemia of patients with lung squamous cell carcinoma. In addition, squamous cell carcinoma tumors are generally large and the tumor blood vessels are unevenly distributed. Lead to degeneration and necrosis of some tumor cells, increase in alkaline phosphatase activity, and cause calcium deposition.

C T has the advantages of fast and convenient examination, non-invasive, high resolution, and is an effective method for early lung cancer screening. On the one hand, CT is highly sensitive and specific to the lesion. Through conventional scanning and enhanced scanning, the lesion can be distinguished from the surrounding tissues, and the shape, edge, and bronchial involvement of the lesion can be clearly observed, and it can reflect the internal conditions of the lesion, Can improve the diagnosis effect of the lesion. On the other hand, CT can be used to reconstruct images from different angles and levels, which facilitates observation of lesions from multiple angles and multiple directions, avoids the omission of small lesions and hidden lesions, improves the accuracy of diagnosis, and can determine whether there is a mediastinum Lymph node metastasis provides a reliable basis for evaluating the clinical staging of lung cancer [5]. In addition, CT can show the density change of the lesion, observe whether the lesion has lobes, whether the outline is clear, whether there is calcification inside, etc., so as to provide a sufficient basis for judging benign and malignant lesions. The sensitivity of X-ray examination is relatively low, and the effect of distinguishing the lesion from the surrounding tissues is not obvious. The missed diagnosis rate of hidden parts such as the supraphrenic, lung apex, paraspine, mediastinum, and posterior heart is relatively high. Therefore, CT is better than X-ray in distinguishing benign and malignant lung lesions, the image display is clearer, the observation is more comprehensive, and the assessment

effect of the lesion is better. However, CT also has certain shortcomings. Its cost is relatively high, and there is a certain amount of radiation during the inspection process. It is necessary to continuously improve the clinical inspection technology to reduce the impact of these shortcomings on the inspection.

5. Conclusion

In summary, CT is better for the differential diagnosis of benign tumors and lung cancer, and the imaging findings are more comprehensive and detailed. This is a better diagnostic method and should be popularized and promoted in clinical diagnosis.

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