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The role of computer tomography in diagnostics of central lung cancer

Summary

The research was carried out in Oncological Clinic of Azerbaijan Medical University, Scientific Research Institute of Pulmonary Diseases, National Oncological Centre in 2009–2013. 45 patients' archives and current materials were used in the research. Patients were examined by radiodiagnostic methods and histologically verified.

The results of the study revealed that the method of computer tomography (CT) is much more informative than X-ray (more than 10 times). However, the image of central lung cancer on CT has different shape and density and depends on several factors (histological forms, presence of bronchial obstruction), which lead to some difficulties during the differential diagnosis in clinical practice.

Thus, the diagnosis of central lung cancer should be mandatory with regard anamnestic data, clinical symptoms and results of diagnostic complex and consist of radiology, X-ray and histological examination.

Key words: central lung cancer, computer tomography, radiology

Lung cancer (LC) takes the first place in the structure of oncological diseases. In 1991–2001 61106 patients were firstly registered with malignant tumor in Azerbaijan, 7024 of whom were ill with LC. In the mentioned period 31881 men were diagnosed with malignant tumor for the first time, 5691 (17,85 %) of them had LC [2].

Central LC (CLC) has relatively latent course and apart from peripheric cancers has got long roentgen negative period. According to some authors CLC is revealed after patients' complaints in most cases (80,6–89 %) [1].

Roentgenography and computer tomography (CT) were compared and authors came to conclusion that determination of CLC by CT is 10 times higher than by roentgenography [3].

Numerous researchers proved the advantage of CLC first diagnostics by CT more than roentgenological examination, some questions have not been still solved. Thus, studying the role of CT in early LC diagnostics and including of this method into screening program are actual problems of oncology.

Taking the above mentioned into consideration, the aim of our research is to study the possibilities of CT examination and diagnostic semiotics at LC early stage.

Materials and methods of the research

The research was carried out in the Oncological Clinic of Azerbaijan Medical University, Scientific Research Institute of Pulmonary Diseases, National Oncological Centre in 2009–2013. 45 patients' archives and current materials were used in the study, they were examined by radiodiagnostic methods and histologically verified.

42 patients were male (93,3 %) and 3 (6,7 %) – female at the age of 48–78 (average age 61).

Squamous cell carcinoma was diagnosed in 32 patients (71,1 %), adenocarcinoma – in 5 patients (11,1 %), small-cell cancer – in 4 patients (8,9 %) and large-cell carcinoma – in 4 (8,9 %) patients.

CT was taken by "Toshiba Asteion", "Somatom Emotion Duo" and "Somatom Volume Zoom Siemens" apparatuses. All images were analysed in pulmonary (650–1000 Hounsfield Units, HU) and mediastinal (50–400HU) windows.

Analysis of CT was carried out by visual method and in 21 (46,6 %) patients – by densitometric appreciation methods. In the structure of pathological focus, the condition of attached tissue was valued, densitometric analysis was performed by Hounsfield Unit (HU).

For evaluation of function of magistral vessels' condition, the contrast method was used in 2 patients (4,4 %). During this process 20–40 ml of contrast substance (urographin, verographin) was intravenously injected.

For classification of patients taking part in our research, the 7-th (2009) TNM Classification of Malignant Tumours was used and this classification chart is shown in the Table 1.

Analysis of the table shows that the I stage of disease was revealed in 22 (48,9 %) patients, the II stage was in 23 (51,1 %) patients. The patient reffering to IA stage wasn't noted in the research.

Table 1. Classification of the patients with central lung cancer due to TNM staging system

Stage	TNM	Amount of the patients	%
IB	T2N0M0	22	48,9
II	T2N1M0	4	8,9
	T3N0M0	19	42,2

Table 2. Computer tomography semiotics of central lung cancer

	Amount of the patients	%
Size of tumor:		
up to 3 cm	10	22,2 %
more than 3 cm	33	73,3 %
Shape:		
Round	7	15,5 %
Oval	4	8,8 %
Irregular	27	60 %
Other	5	11,1 %
Circuit:		
Spicular	5	11,1 %
Smooth	2	4,4 %
Not exact	8	17,6 %
Irregular	28	62,2 %
Cavity	3	6,6 %
Tissue attached to the tumor:		
Infiltration	23	51,1 %
Emphysema	85	17,7 %
Fibrous	2	11,1 %
Past tuberculosis foci	1	4,4 %
Icy glass	17	2,2 %
Without pathology		37,7 %

Statistic analysis of the research results was counted by computer using IBM SPSS Statistics 20 programme.

The results and discussion

In 2 patients (4,4 %) in the CT examination atelectasis had impeded the reveal of the tumor. In these patients the doctor suspected LC and histological test proved his guess. But in the rest of patients (95,6 %) tumour was visualized by CT.

In patients taking part in the research by CT semiotics CLC changes in tissues around tumour, the relations between the tumor and the level of the broncho-obstruction were analyzed and the following table was described.

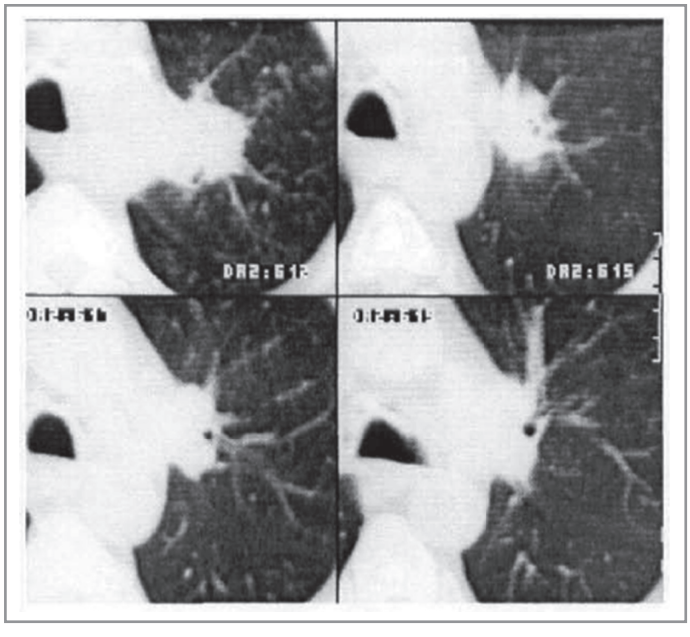

Figure. Central lung cancer of the upper lobe. Hypoventilation of the upper lobe of the lung

CLC was revealed in 10 patients (22,2 %) with tumor up to 3 cm – and in 33 (73,3 %) with tumor more than 3 cm.

Tumor was localized more in the right lobe of the patients taking part in the research (60 %) (p<0,01). Tumor was mostly revealed in the upper lobe in 20 (44,5 %) patients than in the lower lobe – 18 (40 %) patients, in less cases – in the middle lobe (9,5 %).

The results of the research showed, if the shape of node is either irregular, circumpheral or lobular, margins are irregular, the risk of carcinoma is high, but for determination of malignant or benign form it isn't reliable[4]. According to the shape of tumor the patients were classified as follows: 27 patients (60 %) with irregular shape, 7 (15,5 %) – with round, 4 (8,8 %) – with oval, 3 (6,6 %) – with spread and 2 (4,4 %) with polygonal shape.

In 8 (17,7 %) patients tumor had not exact margins, 5 (11,1 %) patients had spicular margins. Thus, only few patients (4,4 %) had tumor with smooth margins, 41 (91,1 %) had malignant tumor with irregular margins (p<0,01).

Analyzing the structure of tumor, cavernous cavity was met in 3 patients (6,6 %). The walls of the cavity were 16 mm and that made us to suspect malignant process (p<0,01).

21 patients (46,6 %) underwent densitometric evaluation. In these patients index was about 36,2 HU. This index consists with literature information [5]. After using contrast study, heterogenous contrast was observed in all patients, which is proper to LC (p<0,01).

During the evaluation tumor formed an obturation in bronci condition: 5 (11,1 %) patients – in segmentar bronchi, 14 (31,1 %) – in lobular bronchi. In other patients bronchial passage was opened (57,7 %).

Different changes were revealed by tomography in lung tissues around the tumor. So, in 23 (51,1 %) patients infiltrative area and in 5 (11,1 %) patients fibrous tissue was observed. 1 (2,2 %) patient had an "icy glass" symptom.

Thus, during morphological estimation of LC we see that tumor shape is irregular round, circuit is rough, contrast is heterogenous. Frequency of occurrence of bronchial passage opening and closing is relatively equal.

Conclusion

As it is seen the picture of CLC in CT is different, so some difficulties appear in clinical practice. Solving this problems is possible by estimation of anamnestic findings, clinical symptoms and complex radial diagnostic tests all together.

Literature

1. Королева И.М. Лучевая диагностика рака легкого// Справочник поликлинического врача, 2008, №12, с. 12–18
2. Gaziyev A. Epidemiology, medical, demographic and social-economic aspects of malignant tumors in Azerbaijan / A. Gaziyev // Essay Dissertation doctor of medical science. – Baku, 2005. – 35 p.
3. Gregory J. Distribution of Stage I Lung Cancer Growth Rates Determined with Serial Volumetric CT Measurements / J. Gregory, T. Helen, D. Winer-Muram // Radiology. – 2006. – Vol. 241, N2. – P. 554–563.
4. Jeong Y. Solitary Pulmonary Nodules: Detection, Characterization, Guidance For Further Diagnostic Workup, Treatment / Y. Jeong, A. Chin, K. Lee // A. A. J. Roentgenology. – 2007, N188. – P. 57–68.
5. Octay A. Signs in chest imaging / A. Octay, G. Gokhan, T. Ugur // Diagn. Interv. Radiol. – 2011, N17. – P. 18–29.

Резюме

Роль компьютерной томографии в диагностике центрального рака легких

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Исследование проведено в 2009–2013 годах в Онкологической клинике Азербайджанского медицинского университета, в научно-исследовательском Институте пульмонологии Азербайджанской Республики на основании анализа данных истории болезни 45 больных с диагнозом центральный рак легких, подтвержденного данными компьютерной томографии и гистологического анализа.

На основании результатов проведенного исследования установлено, что метод компьютерной томографии (КТ) значительно более информативен, чем рентгенологический метод исследования (более чем в 10 раз). Однако изображение центрального рака легких на КТ различно и зависит от нескольких факторов (его гистологической формы, наличия или отсутствия бронхиальной обструкции), что в клинической практике создает определенные трудности в проведении дифференциальной диагностики.

Таким образом, диагностику центрального рака легких следует проводить с обязательным учетом анамнестических данных, клинических симптомов и результатов комплексного радио- и рентгенодиагностического и гистологического обследования.

Ключевые слова: центральный рак легкого, компьютерная томография, лучевая диагностика

Резюме

Роль комп'ютерної томографії в діагностиці центрального раку легень

Б.А. Бахшиєв, В.А. Дадашова

Дослідження проведено в 2009–2013 роках в Онкологічній клініці Азербайджанського медичного університету та науково-дослідному Інституті пульмонології Азербайджанської Республіки на основі аналізу даних історії хвороб 45 хворих з діагнозом центральний рак легень, який було підтверджено даними комп'ютерної томографії та гістологічного аналізу.

За результатами проведеного дослідження виявлено, що метод комп'ютерної томографії (КТ) є значно більш інформативним, ніж рентгенологічний метод дослідження (більш ніж у 10 разів). Проте зображення центрального раку легень на КТ має різну форму та щільність і залежить від кількох факторів (його гістологічної форми, наявності бронхіальної обструкції), що зумовлює певні труднощі при проведенні диференційної діагностики у клінічній практиці.

Таким чином, діагностику центрального раку легень слід проводити з обов'язковим урахуванням анамнестичних даних, клінічних симптомів та результатів комплексного радіо- і рентгенодіагностичного та гістологічного обстеження.

Ключові слова: центральний рак легень, комп'ютерна томографія, променева діагностика