# The Value Analysis of CT Diagnosis of Lymph Node Metastasis in Cervical Cancer

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Abstract: The value of CT in diagnosing cervical cancer lymph node metastasis: Select 50 patients who received treatment at our hospital from March 2021 to March 2022, and organize preoperative CT data of the patients. Determine lymph node metastasis from four aspects: size, shape, enhancement, and distribution, and compare them with postoperative pathological results of the patients. A total of 22 out of 50 patients showed lymph node metastasis. (1) There were statistically significant differences between the groups in terms of length to diameter, short length to diameter ratio, morphology, edge, and enhancement performance of lymph nodes (P<0.05), while the difference in enhancement density was not statistically significant (P=0.715). The comprehensive analysis results of statistically significant manifestations in each group showed that the sensitivity of  $\geq 3$  CT manifestations was 81.23%, and the specificity was 83.17%. (2) According to the drainage pathway of pelvic lymph nodes, lymph nodes are divided into three stations, with the second station having the highest metastasis rate (15.63%, 29.78%, 9.68%, respectively). Conclusion: When the length to diameter of lymph nodes is  $\geq$ 10mm, the ratio of short length to diameter is  $\geq 0.7$ , the shape is circular or approximately circular or irregular, the edge is blurry, or there is adhesion, uneven en hancement, or circular enhancement with surrounding tissues, the diagnostic value of lymph node metastasis is higher. More than 3 features indicate a higher likelihood of lymph node metastasis. The distribution of lymph node metastasis in cervical cancer has a certain pattern.

Keywords: Cervical Tumors; 640row Volume CT; Cancer

#### 1. Introduction

Cervical cancer is a common and severe disease among women, with a high overall mortality rate and a serious impact on women's work and life. With the rapid development of society, the screening efforts for cervical cancer diseases are constantly increasing<sup>[2]</sup>. In order to further improve the detection rate of cervical cancer lesions and cervical cancer lesions, enhance effective prevention and treatment measures for patients, and comprehensively reduce the mortality rate of patients. For cervical cancer patients, surgical treatment can complete disease treatment, but lymph nodes can metastasize, and if metastasis occurs, it will have a negative impact on the patient's prognosis. Reduce the patient's disease treatment rate. In the treatment of cervical cancer, various imaging detection methods are used to treat patients, better improving their healing effect and meeting their physical health requirements.

Nowadays, there are more and more patients with cervical cancer, showing an increasing trend every year. If cervical cancer lymph node metastasis occurs, it will have a very serious adverse impact on the prognosis of patients. Once lymph node metastasis occurs, the survival rate of patients will be greatly reduced.

Therefore, timely detection of lymph node metastasis can significantly improve the survival treatment and probability of cervical cancer patients. However, in this stage, adopting corresponding clinical diagnostic methods is crucial. Currently, clinical diagnoses commonly used for lymph nodes include MRI, ultrasound, lymph node imaging, and CT, among others. According to relevant clinical reports<sup>[1]</sup>, clinical CT plays a crucial role in the diagnosis of cervical cancer cell lymph nodes, and the widespread application of multi-slice spiral CT in clinical diagnosis can make their layers thinner, making it of great clinical diagnostic value.

#### 2. Materials and Methods

#### 2.1 General Information

Select 50 patients who came to our hospital for treatment from March 2021 to March 2022. The age of the patient is 35-68 years old, with an average age of  $(42.12 \pm 4.85)$  years. Pathological types include 42 cases of squamous cell carcinoma, 5 cases of adenocarcinoma, and 3 cases of adenosquamous cell carcinoma.

Inclusion criteria: (1) Those who meet the diagnostic criteria for cervical cancer in the "Guidelines for the Diagnosis and Treatment of Common Gynecological Tumors (2nd Edition)"; (2) Those with a sexual history of more than 3 years; (3) Non pregnant or lactating patients; (4) Those with complete clinical data; (5) Patients undergoing pelvic lymph node dissection and extensive hysterectomy. Exclusion criteria: those with other gynecological diseases; Individuals with impaired coagulation mechanisms; Individuals with significant organ dysfunction; Individuals with other cancers; Unable to cooperate in completing this research.

#### 2.2 Method

CT examination: The instrument is the 640row volume CT of Canon Corporation. Before the examination, the patient is advised to hold their breath during the scanning process. The patient is placed in a supine position and undergoes routine CT plain scan from below the diaphragm to the level of the pubic symphysis. Scanning parameters: tube voltage and tube current are 120kV and 300mA respectively, layer thickness and spacing are 5mm, and matrix is  $512 \times 512$ . Afterwards, an enhanced scan was performed by injecting 100mL of iohexol injection into the elbow vein at a rate of 3mL/s. After 30 seconds of injection, arterial phase scan (liver) was performed, and portal phase enhanced scan (whole abdomen, chest abdomen, pelvic cavity) was performed with a delay of 65-75 seconds. If necessary, equilibrium phase scan could be performed. Upload the obtained data to the post-processing workstation and use techniques such as multiplanar reconstruction (MPR), maximum density projection (MIP), and volume rendering (VR) for image reconstruction. Two experienced senior imaging physicians independently reviewed the film based on the patient's condition and reached the final diagnosis through consultation.

All patients should be scanned and diagnosed using multi-slice spiral CT. Before scanning, patients should be given appropriate respiratory training to receive the scan with a calm and stable mindset. The scanning parameters should be set to 120kV, 50mA, and the matrix should be 5125df3095eec01c\_HTML\_ 49699d9c9e2b6f66.gif 512. Non ionic contrast agents are injected using a high-pressure syringe at a dose of 2ml/kg and a speed of 3ml/s. Scanning starts 60 seconds after injection of contrast agent, with a scanning range from the diaphragm to the pubic symphysis level. Thin layer reconstruction is performed with a thickness and spacing of 2mm. The scanning images are analyzed by experienced radiologists, and the diagnostic results are determined after comprehensive analysis and summary<sup>[1]</sup>. The maximum transverse diameter of multi-slice spiral CT diagnostic criteria for cervical cancer lymph node metastasis patients without pathological examination is greater than 11mm. After the completion of multi-slice spiral CT diagnosis, all patients underwent lymph node dissection to record the lymph node metastasis at various anatomical sites of the patients, followed by pathological examination. Finally, data analysis was conducted on false positives, false negatives, etc. of multi-slice spiral CT diagnosis.

Pathological diagnosis: After the CT examination, lymph node dissection is performed, and each artery is marked based on its anatomical and physiological position, and lymph node metastasis at different anatomical positions is recorded.

#### 2.3 Observation indicators and judgment standards

Observation indicator: Compare the lymph node metastasis detected by CT with the pathological examination results. Calculate the diagnostic efficacy of CT examination and observe CT manifestations.

The criteria for lymph node metastasis in CT examination: CT examination shows that the lymph node morphology is round or elliptical, with blurred boundaries and significant enhancement; The capsule of lymph nodes is significantly damaged; The shortest transverse diameter of lymph nodes is  $\geq$  10mm, with a low density center.

True positive: For each group of lymph nodes in cervical cancer patients with lymph node metastasis, if the diagnosis is positive on multi-slice spiral CT and pathological examination also observes lymph nodes as positive, it is judged as true positive. False positive: If each group of cervical cancer lymph node metastasis patients is diagnosed as positive by multi-slice spiral CT, but pathological examination does not observe any lymph nodes as positive, it is considered false positive<sup>[3]</sup>. True negative: For each group of lymph nodes in cervical cancer patients with lymph node metastasis, if the diagnosis is negative on multi-slice spiral CT and pathological examination also shows lymph nodes as negative, it is considered true negative. False negative: If the diagnosis of lymph node metastasis in each group of cervical cancer patients is negative on multi-slice spiral CT, and no lymph nodes are observed to be negative on pathological examination, it is considered false negative.

#### 2.4 Statistical methods

Analyze the data using SPSS 21.0 statistical software, and count the data in frequency (n) and percentage (%)  $\chi$  2 tests, P<0.05 indicates a statistically significant difference.

## 3. Results

### 3.1 Lymph node metastasis

The pathological examination results showed that 22 out of 50 patients had lymph node metastasis; CT examination showed a total of 18 cases of lymph node metastasis. There was no statistically significant difference in the lymph node metastasis rate of cervical cancer between CT examination and pathological examination results (P>0.05).

### 3.2 Diagnostic Effectiveness

The diagnostic sensitivity of CT examination for cervical cancer lymph node metastasis is 95.31%, specificity is 88.89%, accuracy is 64%, positive predictive value is 89.47%, and negative predictive value is 91.43%.

## 4. Discussion

Cervical cancer is more common in middle-aged and elderly women, and may be related to factors such as viral infection, sexual behavior, number of deliveries, and malnutrition. The symptoms and signs of cervical cancer are usually not obvious. As the condition progresses, irregular vaginal bleeding and abnormal vaginal discharge may occur<sup>[2]</sup>. In the late stage, the invasion range of the lesion continues to expand, affecting the whole body organs and tissues, causing organ failure. Therefore, it is very important to implement effective treatment for cervical cancer patients as soon as possible. Surgery can effectively remove the lesion, but lymph node metastasis can have a direct impact on the patient's prognosis and quality of life.

The channels for lymph node metastasis in cervical cancer are generally the internal iliac external artery, common iliac artery, abdominal aorta, paracervical, obturator, etc. In previous clinical evaluations of cervical cancer, the main focus was on the size of the primary lesion, depth of cervical infiltration, and degree of surrounding tissue invasion, without emphasizing regional lymph nodes. Lymph node metastasis can affect the scope of lymph node dissection during surgery and the formulation of postoperative radiotherapy and chemotherapy plans. Therefore, accurate diagnosis and evaluation of preoperative lymph node metastasis is of great significance for targeted treatment of cervical cancer and improving prognosis.

In this study, the lymph node metastasis rate of 50 cervical cancer patients was 44%. The diagnostic results of CT examination were similar to those of pathological examination, indicating a high diagnostic accuracy of CT examination; By analyzing the diagnostic efficacy of CT examination, it was found that CT examination has high accuracy in diagnosing cervical cancer lymph node metastasis. The reason for the analysis is that multiple CT imaging techniques were applied in this study, which can prevent confusion with normal structures near the cervix, normal lymph nodes, or normal physiological changes in the ovaries. It can comprehensively analyze the general characteristics of lymph node metastasis and more accurately determine the status of lymph node metastasis. In addition, through analysis of CT manifestations, it can be seen that lymph node metastasis is more common in cervical

cancer patients with a long diameter of  $\geq$  10mm, a short diameter of 0.7-0.9mm, non fusion (circular, elliptical, irregular) shape, blurred boundaries or adhesion to surrounding tissues, uniform or circular enhancement. Based on CT manifestations, the occurrence of lymph node metastasis can be predicted to a certain extent<sup>[1]</sup>. The threshold for CT diagnosis of lymph node metastasis is mostly concentrated between 6-15mm, and the diagnostic threshold is generally based on a lymph node diameter of 10-15mm. In addition, a short diameter of 0.7-0.9mm has a certain role in distinguishing lymph node metastasis. Metastatic lymph nodes have the characteristics of malignant tumor growth and invasive growth, which can lead to changes in lymph node morphology. Therefore, based on the morphology of lymph nodes, not only can they be distinguished from benign and malignant, but also the presence of metastasis can be determined. Homogeneous enhancement and dense texture of lymph node metastasis are not high. On the contrary, circular enhancement has a high diagnostic sensitivity for lymph node metastasis, and combined with the difference in enhancement density, it can play a certain role in diagnosing lymph node metastasis. As the difference in enhancement density increases, the specificity will gradually decrease to less than 50%, leading to misdiagnosis. This is because the difference in enhancement density of lymph nodes cannot be used as a separate criterion for diagnosing cervical cancer lymph node metastasis. Therefore, there is no statistical significance in the comparison of clinical data, indicating the need to combine other criteria for comprehensive diagnosis. Therefore, in this study, multiple CT manifestations will be combined for diagnosis, Able to achieve high diagnostic sensitivity and specificity.

Nowadays, with the continuous development of the social economy and the continuous improvement of clinical medical technology, multi-layer spiral CT is also widely used in many hospitals, especially in the clinical diagnosis of various malignant tumor lymph node metastases. Because the continuous growth, division, and degree of lymph node specificity of cervical cancer cells can cause changes in the density and morphology of related tissues in patients.

In clinical practice, lymph node metastasis in cervical cancer is a key indicator to distinguish between stage IIa and stage IIb of cervical cancer, and also provides a reference basis for clinical treatment plans. Normally, once a patient's clinical stage is before stage IIb, according to theory, a clinical surgical treatment mode can still be implemented. However, once the patient's clinical stage is in stage IIb or after stage IIb, due to the occurrence of lymph node metastasis of cancer cells<sup>[2]</sup>, clinical surgical treatment cannot completely remove the entire lesion area, and radiotherapy must be performed on the patient Chemotherapy or a combination of two methods for treatment, As shown in Figure 1.





node size to determine the extent of metastasis. However, using this method can also result in false negatives and false positives. Pathological diagnosis has also found that some lymph nodes below 11mm also have metastasis, while some lymph nodes above 11mm have not. This is mainly due to the difficulty in distinguishing lymph node metastases of uniform size on CT, and also because some cervical cancer metastases have relatively small lymph nodes, which leads to false positives and significantly reduces the sensitivity of clinical diagnosis. In addition, in terms of incidence rate, the larger the lymph node, the greater the possibility of metastasis of cancer cells; on the contrary, the smaller the lymph node, the greater the probability of benign tumors. According to relevant clinical reports, the application of multi-slice spiral CT enhanced scanning can significantly improve the accuracy of clinical diagnosis. During enhanced scanning, the patient's blood vessels will be significantly enhanced, making it very easy to distinguish between lymph nodes and blood vessels. During clinical examination, planar scanning may confuse normal structures near the cervix with lymph nodes. However, when multiple layers of observation and reconstruction of multiple planes are used for scanning, lymph nodes usually appear as circles or nodules, and structures adjacent to the cervix may appear as linear or irregular shapes, making confusion less likely. When using multi-slice spiral CT to diagnose lymph node metastasis in cervical cancer, the number, size, and density of lymph nodes should be taken into consideration. This can significantly improve the clinical diagnostic rate, especially when observing the density and discovering uneven density display of a certain lymph node accompanied by necrotic areas, usually due to lymph node metastasis.

Research has shown that multi-slice spiral CT has significant advantages in the early diagnosis of cervical cancer primary lesions. When the tumor undergoes necrosis, ulcers, and other changes in the early stage, spiral CT examination can display low enhancement manifestations, and thin coronal, sagittal, and axial images can be obtained through multi plane reconstruction counting, fully demonstrating the spatial relationship between the cervix and vagina, and providing more information for early diagnosis.



Figure 2: Cervical ultrasound imaging

At present, as shown in Figure 2, CT and ultrasound imaging are commonly used in clinical diagnosis of cervical cancer lymph node metastasis. Color ultrasound has the advantages of strong mobility, repeatable operation, and low cost in clinical diagnosis. In the process of diagnosing cervical cancer lymph node metastasis by ultrasound, the size and shape of lymph nodes can be clearly displayed, and the relationship between lymph nodes and surrounding tissues can be effectively reflected, displaying blood flow signals, However, this diagnostic method is aimed at larger lymph nodes and cannot obtain complete images. At the same time, it has a high misdiagnosis rate for patients with smaller lymph nodes. Multi slice spiral CT has a high diagnostic rate for cervical cancer lymph

node metastasis, which can effectively diagnose whether patients have lower iliac lymph node metastasis and internal iliac lymph node metastasis<sup>[4]</sup>. The imaging is clear and can comprehensively analyze the general characteristics of lymph node metastasis, such as size and number, with high diagnostic accuracy. However, CT diagnostic methods have high requirements for operators, and the test results can be influenced by human factors. The diagnostic specificity of multi-slice spiral CT is higher than that of color ultrasound, with P<0.05. It can be seen that both imaging methods have their own advantages and disadvantages, but the advantages of multi-slice spiral CT are more obvious in terms of comprehensive diagnostic performance.

## 5. Conclusions

In summary, CT examination can provide comprehensive and accurate diagnostic information for cervical cancer lymph node metastasis, facilitating the development of more targeted treatment plans in clinical practice.

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