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ARTICLE

Magnetic Resonance Imaging for Diagnosis and Analysis of Bone Tumors and Bone Tuberculosis

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Abstract: The purpose of the study is to explore the diagnostic value of magnetic resonance imaging in bone tuberculosis and bone tumors. Firstly, 148 patients with bone tumor and bone tuberculosis were selected, 74 cases in each group. Perform magnetic resonance imaging (MRI) examinations on all patients, relevant parameters were set and the changes in the value of the dispersion system were recorded to obtain T1-weighted imaging and T2-weighted imaging. The results showed that among 74 patients, 41 cases were bone damage, 38 cases were joint swelling, 27 cases were sparse bone, 10 cases were bone hyperplasia and 5 cases were dead bone and calcification. The imaging manifestations of bone tumors were 45 cases of fractures, 26 cases of surrounding soft tissue infiltration, 10 cases of hip duct enlargement and 11 cases of sacral foramen enlargement. After MRI diagnosis, the accuracy of diagnosing 74 cases of bone tumor was 100%, and the accuracy of diagnosing 65 cases of bone tuberculosis was 87.84%. The difference between the two groups was statistically significant ($P<0.05$). The diffusion sensitivity coefficient of MRI weighted imaging was 150 s/mm2, and there was no significant difference in ADC values between the two groups ($P>0.05$). When the diffusion sensitivity coefficient is 300 s/mm2, and the difference between the two groups was statistically significant ($P<0.05$). Therefore, MRI had a certain diagnostic value for bone tuberculosis and bone tumors, and MRI had a higher diagnostic value and richer information for bone tumors. Corresponding treatment can be performed to improve the prognosis.

Keywords: Magnetic resonance imaging; Bone tuberculosis; Tumor diagnosis

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1. Introduction

Radiotherapy is one of the important methods for the treatment of malignant tumors. More than 60% of patients with malignant tumors receive radiotherapy, and imaging methods are urgently needed to evaluate the effect of tumor radiotherapy early and accurately [1]. With the continuous development and improvement of imaging technology, the MRI has great potential in clinical application [2]. Traditional computed tomography (CT) is obviously insufficient for radiation-sensitive organs and target areas, especially soft tissue areas with low contrast values of tumor soft tissues such as pelvis, spinal cord, head and neck, prostate, etc., which is not conducive to the development of radiotherapy [3]. When the CT positioning method is used to obtain the images of target area and surrounding organs before or during the radiotherapy on patients, it is difficult to distinguish the normal organs around the tumor. The high frequency of cone-beam CT can easily increase the probability of secondary tumors [4]. MRI is a non-invasive and high-resolution diagnostic technology with a high clinical application rate. MRI is characterized by multiple parameters, high soft tissue resolution and radiation. It can highlight specific organs or

tumors by adjusting the imaging contrast (such as T_1, T_2 and diffusion) [5]. The principle of MRI is different from that of X-ray and CT. MRI has very high resolution for soft tissues and high diagnostic value for the initial diagnosis of bone tumors, which is also used in the clinical diagnosis of spinal tumors, bone marrow and soft tissues. The practical rate of the method is very high, but this method also has some drawbacks, that is, the detection rate and specificity of calcification foci is low [6]. Bone tumor and bone tuberculosis are highly similar clinically high-incidence diseases, which is prone to misdiagnosis during the initial diagnosis. Once a misdiagnosis is made, it would affect the treatment effect and reduce the prognosis. In the process of MRI examination of bone tissue, weighted imaging can show the infiltration of malignant tumors. After weighted imaging of tissues, it can effectively show the diffusion of water molecules. Routine inspections are performed and the weighting after the competition is obviously affected. With a certain limitation, the imaging signal would increase, and the weighted imaging signal after diffusion can be affected by cell density, tissue perfusion and penetration [7-8]. With the T_1W_1 signal increases, the diffusion rate is limited and false positives occur. In order to improve the diagnostic accuracy of bone tumors and reduce the occurrence of misdiagnosis and misdiagnosis, the study applied MRI and CT to timely joint diagnosis of bone tumors and bone tuberculosis, analyzing its clinical diagnostic value.

2. Materials and Methods

2.1 Subjects

148 patients with bone tumor and bone tuberculosis were collected in our hospital from August 2017 to August 2018. Among them, there were 74 cases in the bone tumor group, including 40 males and 34 females, with an average age of (23.42±1.68) years (13-33 years old). The three groups of general information (such as gender and age) showed no statistical difference (P>0.05). There were 74 cases in the bone tuberculosis group, including 41 males and 33 females, aged 14-34 years old, with an average age of (23.52±1.70) years old. Patients were compared in terms of general information, the difference was not statistically significant (P>0.05). The patients with tumors in other systems of the whole body were excluded, and the patients with liver and kidney dysfunction and organic diseases such as heart and lungs were exclued.

2.2 Methods of Imaging

Perform MRI examinations on all patients, relevant parameters were set and changes were recorded in the dispersion system values to obtain T_1-weighted imaging and T_2-weighted imaging. A comparison was done between the diagnosis of bone tumor and bone tuberculosis patients. After the analysis of imaging, it was noticed that diagnostic criteria of bone tuberculosis (such as the soft tissue masses, the surrounding lesions and necrosis) were obvious, and the tissues and organs around the lesions were characterized by sagittal, coronal and axial. Considering bone tumor diagnostic criteria, it can be considered for bone marrow edema, but it was not good for calcification.

2.3 Statistical Method

SPSS18.0 statistical software was used for data sorting and analysis. The measurement data were expressed by Mean±SE, the independent-sample t test was used for comparison between the two groups; the χ^2 test was used for the comparison of count data between groups. P<0.05 indicated that the difference was statistically significant.

3. Results and Discussion

As shown in Table 1, among the 74 patients of bone tuberculosis imaging, 41 cases had bone destruction, 38 cases had joint swelling, 27cases had sparse bone, 10 cases had hyperostosis, and 5 cases had dead bone and calcification. Imaging findings of bone tumors: bone rupture in 45 cases, peripheral soft tissue invasion in 26 cases, enlargement of hip canal in 10 cases, enlargement of sacral foramina in 11 cases. In addition, among the 74 patients of bone tumors imaging, bone rupture were in 45 cases, peripheral soft tissue invasion were in 26 cases, enlargement of hip canal were in 10 cases, and enlargement of sacral foramina were in 11 cases. Then the accuracy of diagnosis through MRI diagnosis were judged. The results showed that the accuracy of diagnosing 74 cases of bone tumors was 100 %, and the accuracy of diagnosing 65 cases of bone tuberculosis was 87.84 %. The difference between the two groups was statistically significant (P<0.05).

Table 1. Comparison of diagnostic accuracy between the two groups

Group	Number of cases	Diagnosis (n)	Diagnostic accuracy rate (%)
Bone tumor group	74	74	100
Bone tuberculosis group	74	65	87.84
χ^2			9.5827
p			<0.05

Then weighted imaging is performed on MRI. As shown in Table 2, when the diffusion sensitivity coef-

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ficient was 300 s/mm^2, the difference between the two groups was significant (P<0.05). When the diffusion sensitivity coefficient was 150 s/mm^2, there was no significant difference in ADC value between the two groups (P>0.05).

Table 2. Comparison of ADC values between the two groups of patients (x±s)

Group	Number of cases	b=150 s/mm^2	b=300 s/mm^2
Bone tumor group	74	2.11±0.32	1.34±0.52
Bone tuberculosis group	74	1.90±0.28	1.95±0.55
t		1.249	6.933
P		>0.05	<0.05

Combining the above experimental results, the conclusion wsa that after MRI diagnosis, the accuracy of diagnosing 74 cases of bone tumors was 100%, and the accuracy of diagnosing 65 cases of bone tuberculosis was 87.84%. The difference between the two groups was significant. Subsequently, MRI weighted imaging was performed. When the diffusion sensitivity coefficient was 150 s/mm^2, the ADC difference between the two groups was small. When the value of the dispersion sensitivity coefficient is 300 s/mm^2, the difference between the two groups was significant	**Magnetic resonance imaging for diagnosis and analysis of bone tumors and bone tuberculosis**	**Magnetic resonance imaging for diagnosis and analysis of bone tumors and bone tuberculosis**	**Magnetic resonance imaging for diagnosis and analysis of bone tumors and bone tuberculosis**
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4. Conclusion

The results fully proved that MRI had high diagnostic accuracy, high clinical value and clear imaging performance for bone tuberculosis and bone tumors, which can accurately detect bone marrow lesions. MRI technology had a high rate of early detection of bone tumors, and its sensitivity and specificity were higher than those of bone tuberculosis. MRI diagnosis is also very accurate in the clinical diagnosis of diseases such as the brain and spinal cord. It can be quickly imaged, and it can also clearly show the image of the bone destruction of the vertebrae attached to the nucleus.

In summary, MRI has a certain diagnostic value for bone tuberculosis and bone tumors and has a high diagnostic value for bone tumors. The information obtained is rich, and corresponding treatment can be performed to improve the prognosis.

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