The Application and Forensic Significance of Imaging Examination in Lumbar Intervertebral Disc Herniation after Injury

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Abstract. X-ray and CT are commonly used in post-traumatic examination of bone joints, spine, etc, as a traditional imaging examination method. It is a correct and meaningful method and procedure to observe signs and measurement data by imaging examination, in the cases of traumatic lumbar injuries which need forensic identification. What is the first that spring to our mind is the simple, economical, and practical X-ray examinations, as well as the CT examinations that have unique advantages for bone changes in all traditional and conventional imaging techniques before the performing imaging studies.

The changes of the morphological, is also reflected on the changes of MR signal intensity. The distance of the lumbar MR disc more than the median sagittal line, the degree of spinal stenosis etc, as a quantifiable data, can be used to improve the detection of this disease. On this basis, MR has become the first imaging examination method what we need to consider. MR not only has characteristic imaging performance, but also has rich observation indicators and projects. It can be further used to identify the new injury or old wounds of lumbar disc herniation on the basis of image signs by quantitative and qualitative aspects. MR examination method is regarded as an important means of inspection in the forensic identification of this disease.

Introduction

Compared with other medical imaging examination techniques, MR can provide more abundant imaging information, which makes it have great advantages and important effects on clinical diagnosis, guiding treatment and prognosis of diseases. It can be imaged in many forms by multi-parameter, multi-sequence, and multi-angle, and directly images the multiple planes of the organism such as transverse plane, sagittal plane, coronal plane or even various oblique planes, and also avoids the false images in the inspection of X-ray and CT.

In many aspects, MRI has more valuable in the diagnosis of disc herniation than CT, The function of MRI on judging the characteristics of lumbar disc herniation after injury by analyzing the location, direction, signal intensity characteristics and spinal cord compression of disc herniation. It is more intuitive and accurate to judge the morphology, type and direction of intervertebral disc herniation. Because of the high resolution of soft tissue, MRI is unique in showing disc herniation after injury. This is CT and X-ray cannot be compared with MRI.

Application of Imaging Examination in Post-Traumatic Disc Herniation

The location of lumbar disc herniation after injury was similar to that of traditional lumbar disc herniation without trauma, and most of them occurred in L4 / L5 and L5 / S1, and the central type was the most, and the paracentral type was the second. This requires us to take a continuous review and follow-up strategy to avoid unnecessary missed diagnosis and misdiagnosis. According to the study of lumbar disc herniation after injury, it was found that the mixed signals of T1WI, T2WI and T2 were the main signals on MRI, followed by T1WI, T2WI and T2, etc. The signal changes are different from non-traumatic lumbar disc herniation. The MRI signal changes on the disc have certain characteristics, and have a certain reference value to identify and diagnose the disease.

Although CT can clearly show the bone changes, calcification and other old lesions of fracture, it
can also indirectly reflect the signs of disc herniation, spinal cord compression, subcutaneous soft tissue contusion and so on through the change of density. However, the relationship between disc herniation and soft tissue changes after injury is difficult to be intuitively connected, the display of soft tissue is not as good as MRI. In addition, it is difficult to judge fresh or old traumatic disc herniation only by the changes of calcification focus and density. Moreover, due to trauma often caused by the internal structure of the vertebral canal disorder, mild disc herniation often lead to missed diagnosis, forensic identification has brought some difficulty. CT also requires higher parameters and equipment, many small lesions often need three-dimensional reconstruction, thin slice scanning can be accurately detected, which is sometimes difficult to find in the ordinary CT scanning. Compared with other medical imaging techniques, MR can provide more imaging information, which makes it has a great advantage and important role in clinical diagnosis, guiding treatment, assisting prognosis and so on.

To sum up, MRI is superior to X-ray and CT in the diagnosis of post-traumatic disc herniation. Of course, the further CT examination can find calcified focus in the disc to diagnose the old lesions and know the bone condition\[5\].

Forensic Identification of Post-Traumatic Disc Herniation

Identification of Fresh and Old Intervertebral Disc Herniation

Newly occurring disc herniation usually presents clinical symptoms and signs immediately after trauma, and presents as skin contusion, laceration, neuralgia, etc. MRI manifestations are mainly mixed signals. But CT showed that the density of herniated disc was consistent with that of normal disc, and the change of bone was mainly fracture, no calcification was found.

Old disc herniation, clinical manifestations are sometimes atypical, or even inconsistent with the imaging findings. The prominent tissue is difficult to be dehydrated, resulting in uneven density or increased density. Ct and X-ray films sometimes show prominent calcification of the disc tissue. On MRI, the signal of Lumbar Disc Herniation after old injury is different from that of fresh lesion in that the signal gradually weakens and tends to equal signal, some of them are mixed, but the signal is weak, and some cases have prominent calcification of disc tissue on CT and X-ray films\[6,7\].

Relationship between Trauma and Disc Herniation

The location and type of lumbar disc herniation after injury were similar to that of general lumbar disc herniation, mainly on L4/L5 and L5/S1, and mainly on central and paracentral type. When the general symptoms of lumbar disc herniation occur, patients should be highly alert to the possibility of combined trauma and combined injury, and MR examination should be carried out at this time.

Post-injury lumbar disc herniation is characterized by intervertebral disc hybrid signals or other signals on MR. Among them, the prominent intervertebral disc after fresh injury is mainly mixed signal, and the prominent intervertebral disc after old injury is weakened on MRI, if CT, X Intramural calcifications on the line are more likely to be old lesions. When MRI shows changes in spinal cord compression, signal changes are a strong evidence of combined trauma, and abnormal signals in the subcutaneous fat gap of the waist often indicate a diagnosis, Lumbar spine MR. The increase in the distance of the intervertebral disc beyond the median sagittal line, the reduction of the sagittal diameter of the central canal, and the reduction of the transverse diameter of the spinal can assist in the diagnosis of this disease. Through the non-quantitative signs and quantitative data obtained from this study, we found that lumbar disc herniation after injury can be defined by quantitative and qualitative aspects, in addition, to identify lumbar disc herniation after fresh and old injuries, The MR examination method has always been of great significance in forensic identification, providing a valuable reference for the inspection methods provided by forensic identification\[8\].

Application and Prospect of Forensic Identification in Lumbar Disc Herniation

Imaging examination can provide clear and reliable identification evidence, which is a very significant means and method of forensic identification in the clinical practice of forensic
identification. Compared with other medical imaging techniques, magnetic resonance imaging technology can provide more abundant imaging information, which makes it has great advantages and important effects on clinical diagnosis, guiding treatment and assisting prognosis of diseases and so on. MRI not only can image many parameters, sequences and angles, but also can directly image many planes of organism, such as transverse plane, sagittal plane, coronal plane and even all kinds of oblique planes. It also avoids the artifact in X-ray and CT examination

In many aspects, MRI has more valuable than CT in the diagnosis of disc herniation, which is more intuitive and accurate in judging the morphology, type and direction of disc herniation, and has the characteristics of high resolution of soft tissue. It makes MR more clear in showing the soft tissue signs of disc herniation after injury, such as spinal cord changes and surrounding soft tissue edema changes. This is also the place that CT and X-ray cannot compare with MRI. In addition, MRI also has the characteristics of multi-directional, multi-angle display, but also from the macro to the details of post-injury disc herniation of the disc, spinal cord, the surrounding soft tissue conditions. In order to provide better evidence and methods for the evaluation of post-injury lumbar disc herniation.

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References


