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Research Article

Early Imaging Features and Differential Diagnosis of Novel Coronavirus Pneumonia

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Abstract: ***Objective:*** To discuss the early imaging features of novel coronary pneumonia (NCP) and its differential diagnosis with common pneumonia for the clinical Provide relatively correct imaging diagnosis. ***Methods:*** A review of 10 cases of novel coronavirus pneumonia diagnosed in our hospital and surrounding counties was collected, and our hospital's 2019-2020 Common pneumonia such as influenza A and B virus pneumonia, lobar pneumonia and adenovirus confirmed by laboratory tests and abnormal chest radiographs Ten patients each with pneumonia, a total of 40 patients, were collected and their imaging features were analyzed. ***Results:*** In 10 patients with neo-coronary pneumonia, there were 30 lesions on chest CT, with typical characteristic lesions containing bronchograms within their Angiographic thickening; located in the subpleura, with grinding glass-like or combined solid changes, referred to as "extratubular halo", with multifocal and multifocal distribution. Morphology or unilobular large lamellar foci without lymph node enlargement and pleural effusion; 10 cases of influenza A and B virus pneumonia in chest CT performance In nine patients, the lesions were distributed in the subpleural or along the perimeter of the bronchial vessels in the form of an analogous circular ground-glass shadow, some of which was a small piece of solid shadow, 1 The case involved a single lobe of the lung and showed a large mixed ground glass image, and the CT in 10 cases of lobar pneumonia showed that they all had a single large solid lobe The variegated shadow or patchy cloud with blurred margins was triangularly altered with the tip pointing to the lung portal, and there were five cases of air-containing bronchograms. Adenoviral pneumonia is more common in infants and young children, and CT showed single or multiple grinded glass images in both lungs with patchy solid variegated shadows and lobar distribution. ***Conclusion:*** NCP and common pneumonia have certain imaging features that, in combination with laboratory tests and epidemiologic history, allow a preliminary diagnosis to be made. It has certain directions and help for clinical diagnosis.

Keywords: NCP; Pneumonia; Differential diagnosis; Laboratory examination, CT features

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1 Preamble

From December 2019, cases of unexplained pneumonia emerged in Wuhan, Hubei Province, January 2020 No. 7, a novel coronavirus (NCP) was isolated from airway epithelial cells of a self-infected person after laboratory etiological testing. The preliminary determination of the causative agent of this unexplained viral pneumonia is a novel coronavirus. January 12, 2020, The World Health Organization (WHO) named it the 2019 Novel Coronavirus (2019-nCoV). 2020 On February 8, the State Department's Joint Prevention and Control Mechanism (JCPM) unified the term "novel coronavirus pneumonia," abbreviated as... "Neo-crown pneumonia", or "NCP" for short. It is primarily transmitted through droplets and contact, so knowledge of the CT features of NCP pulmonary infections, combined with clinical

and laboratory findings, can be a useful tool for... Early prevention and control, early diagnosis and treatment of this disease provide important and reliable basis[1].

2 Materials and Methods

2.1 General information

Review to collect 10 cases of novel coronavirus pneumonia diagnosed in our hospital and surrounding counties, 10 patients each with common pneumonia such as influenza A and B virus pneumonia, lobar pneumonia and adenovirus pneumonia diagnosed by laboratory tests and abnormal chest imaging in 2019-2020 in our hospital, a total of 40 patients, collect their imaging data, analyze their imaging characteristics, age 1 month-75 years, collect epidemiological history, laboratory tests and chest CT imaging data.
Methods.

Using Philips 64-row and GE 64-row CT, patients were in the conventional supine position, the scan range from the tip of the lung to the bottom of the lung, a single breath hold was completed, and patients who could not cooperate did not need to hold their breath, all using a layer thickness of 5 mm, layer spacing of 5 mm, and reconstruction of 1 mm images, three-dimensional reconstruction in post-processing software, by two senior attending physicians to analyze the lesions, focusing on the distribution, morphology and size of the lesions.

3 Results

3.1 Clinical and laboratory examinations

The incubation period of novel coronavirus pneumonia is 1-14 days, usually 3-7 days, and the age of onset is concentrated in 40-60 years old. The majority of patients are male and have an underlying disease. Most of the patients are male and have underlying diseases, but children and infants may also develop the disease. Clinical manifestations are mainly fever, fatigue and dry cough, with high fever (>38 ℃) and, to a lesser extent, low fever (>37.5 ℃). Patients with coronavirus pneumonia have normal or decreased white blood cell counts and decreased lymphocyte counts. Serum C-reactive protein is increased, blood sedimentation rate is elevated, and liver enzymes and muscle enzymes are elevated in some patients. Influenza A and B virus pneumonia incubation period of 1-7 days, clinical manifestations of fever, runny nose, nasal congestion, fatigue, headache, nausea, vomiting, etc. Symptoms, decreased proportion of lymphocytes and decreased number of platelets. lobar pneumonia is most common in young adults and in winter and spring, with chills, high fever, cough and coughing up rust-colored sputum as the clinical manifestations. Shock, exhaustion, generally elevated white blood cell count, increased neutrophils, and markedly elevated c-reactive protein occur. Adenoviral pneumonia is most common in infants and young children, and the clinical presentation is characterized by acute fever, cough, nasal congestion and pharyngitis, chills, headache, leukocyte and Decreased lymphocyte count and elevated C-reactive protein.

3.2 Imaging manifestations

Of the 10 patients with neo-coronary pneumonia, 9 had abnormalities on chest CT, and 7 showed single lung or bilateral lung with extranodal lung fields. or multiple subpleural mammograms with 30 lesions, 20 of which had bronchograms with a thickened endovascular shadow. Twenty-four cases were located in the subpleural and six in the mid-band; 26 lesions were all with ground-glass-like changes, with intralobular septa and lobules Thickening of the internal septum, five foci with long axes parallel to the pleura, four foci with solid components; two patients with a single subpleural lesion Large range, within which mildly dilated bronchogram and angiogram are seen, with distribution characteristics of multifocal polymorphic or unilobular large lamellar foci. Lymph node enlargement and pleural effusion were not seen in 9 patients (Figure 1) [2-5]; chest CT of influenza A and B virus pneumonia in 10 patients In the presentation, six patients had lesions located in the lower lobes of both lungs, distributed in the subpleural or along the perimeter of the bronchial vessels as a rounded grinding glass shadow, and some Small patchy solid shadow, diffuse or multiple patchy GGO in the lungs of three patients, with or without solid lesions, mostly distributed in the bronchovascular tree Peripheral or subpleural; one patient involved a single lobe of the lung, presenting a large mixed ground-glass image (Figure 2). 8 of the 10 cases of lobar pneumonia were associated with a single lobe of the lung (Figure 2). The cases were young adults, one infant, and one elderly, and the CT showed all of them as single large patch of solid changes or blurred patchy margins. Cloudy shadow with triangular changes with the tip pointing to the pulmonary valve, five cases with air-containing bronchograms, including three upper lobe lesions in the right lung, posterior border Straight

Table 1. Clinical and serological examination of male and female patients with SLE (case number (n%)

clinicals	people	clinical symptom	Characteristic image features
NCP	Mostly male, with underlying disease, but can occur in children and infants.	Fever, fatigue and dry cough predominate	The lesion is located in the external and external zone of the lung field and characteristically presents as an "extra-tubular halo" with a multifocal polymorphic or unilobular large lamellar lesion distribution
influenza A and B virus pneumonia	General susceptibility of the population	Fever, runny nose, nasal congestion, fatigue, headache, nausea and vomiting, and in severe cases, death from exhaustion	Distribution around the bronchial vessels and under the pleura, with lattice-like or honeycomb changes, may have pleural effusion
lobar pneumonia	Most commonly seen in young adults and in winter and spring.	Chills, high fever, cough and coughing up rust-colored sputum are the clinical manifestations, and in severe cases, shock and exhaustion may occur.	Distribution according to lung lobes, with large solid shadows in sheets or triangles, with clear or blurred margins.
adenovirus pneumonia	Most often seen in infants and young children.	Clinical manifestations include acute fever, cough, nasal congestion and pharyngitis, chills and headache.	Multiple ground-glass images in both lung lobe segments with patchy solid images

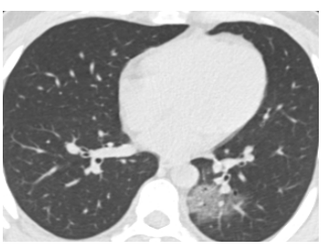

Figure 1, Male 38 years old Left lower lung lobe subpleural mammogram, internal view

Figure 2, Male 24 years old Subpleural or along the bronchial blood in the lower lobe of both lungs. Mildly dilated bronchus and thickened vascular shadow. A rounded grinded glass-like shadow, with some small flaky solid lesions

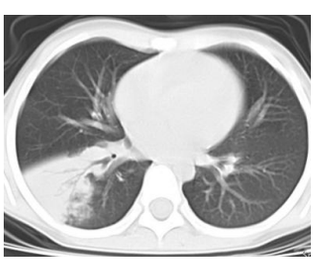

Figure 3, Female 31 years old, large flaky solid lesions in the lower lobe of the right lung

Figure 4, Female 6 years old, multiple nodular and patchy lesions in the upper lobe of the right lung.A triangular change, with the tip pointing to the pulmonary valve, is seen with air-containing bronchograms and lamellar milled glass or solid changes

and clear, two lesions in the middle lobe of the right lung with gradually decreasing density from top to bottom, two lesions in the lingual lobe of the left lung with relatively uniform density, both lungs There were three lower lobe lesions with gradually increasing density from top to bottom (Figure 3)[6]. Adenovirus pneumonia is more common in infants and young children, with CT showing a single or multiple ground-glass image of both lungs with patchy solid lesions and distribution of lobe segments. Lower lobe predominantly, a total of 18 ground glass lesions, with intravascular thickening angiogram, may have pulmonary insufficiency, 5 cases with a single lung lesion, 2 cases with 3 lesions and two cases of three or more lesions (Figure 4)[7]. Show in Table 1.

The number of cases in this group is relatively small, mainly early and progressive cases, which, combined with epidemiological history, clinical features, laboratory tests and chest imaging features, can be helpful in the differential diagnosis with common pneumonia, increase the accuracy of imaging diagnosis, improve the treatment means of clinicians and provide more accurate diagnosis for patients.

4 Application of AI in novel coronavirus pneumonia

In recent years, artificial intelligence (AI) technology (especially deep (learning technology) with its powerful data analysis and feature recognition capabilities, has been used in chest quality control, lung nodule

detection, lung cancer diagnosis and many other areas. Emerging and clinically recognized in lung disease. Whereas the detection rate of AI in GGO is significantly greater than manual detection, early NCP presents with multiple small and patchy GGO shadows. AI has a high rate of detection of early lesions in their NCP, while NCP patients have many lesions in the lungs that change rapidly and are reexamined multiple times in a short period of time The large number of images, such as the number of photos, significantly increases the workload of diagnosing physicians. To provide doctors with accurate information on the dynamic changes in lesion morphology, size and density, thereby significantly reducing the burden on doctors and easing the pressure on medical staff. Reducing the difficult situation of isolation and control and the shortage of medical personn。

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