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20例2019冠状病毒病CT影像学特征分析

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[摘要] 目的: 分析2019冠状病毒病的CT影像学特征, 为临床医生诊断2019冠状病毒病提供一定参考。方法: 选择安徽医科大学第一附属医院2019年1月至2019年3月在全国2019冠状病毒病疫情暴发期间的20例住院患者, 男10例, 女10例, 年龄29~71(46.8±11.7)岁, 所有病例经新型冠状病毒核酸检测确诊; 分析不同随访时间的CT影像图像特征及临床资料。结果: 普通型18例, 重型2例。CT检查肺内多发病变19例(95%), 单发病变1例(5%)。20例病例发现斑片样磨玻璃影19例(95%), 病变大多临近胸膜下区。20例患者共100段肺叶, 其中发现磨玻璃影病变共58叶(58%); 发现斑片样实变影29叶(29%)。住院治疗, 5 d复查胸部CT, 8例患者病情进展, 12例无明显变化。10 d复查, 4例进展, 1例无明显变化, 15例出现吸收征象, 缓解率占75%。15 d后复查随访15例, 均表现吸收征象, 占100%。结论: 2019冠状病毒病的影像特征以磨玻璃样病变为主; 两肺常见多发病变, 病变多分布在胸膜下区; 少有并发胸腔积液或心包积液, 不伴有纵膈及肺门肿大淋巴结; 治疗10~15 d后开始出现逐渐吸收现象。

[关键词] 2019冠状病毒病; 病毒性肺炎; 成人; 计算机断层成像技术

CT imaging characteristics of 20 cases of 2019 coronavirus disease

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Abstract **Objective:** To analyze the CT imaging features of 2019 coronavirus disease, and provide some references for clinicians to diagnose novel coronavirus pneumonia. **Methods:** Twenty hospitalized patients, including 10 males and 10 females, aged 29–71 (46.8±11.7) years old, were selected from January 2019 to March 2019 during the outbreak of 2019 coronavirus disease in the First Affiliated Hospital of Anhui Medical University. The CT image characteristics and clinical data of different follow-up time were analyzed. **Results:** Eighteen cases were normal type, 2 heavy type. CT examination showed multiple lung lesions in 19 cases (95%), and single lung lesions

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in 1 case (5%). In 20 cases, 19 cases (95%) had patchy ground glass shadow, most of which were close to the subpleural area. Of 100 pulmonary lobes in 20 patients, 58 lobes (58%) had ground glass shadow lesions. Speckle consolidation was found in 29 lobes (29%). After hospitalization, chest CT was reexamined 5 days later, 8 patients were disease progression and 12 cases showed no significant changes. After 10 days, 4 cases progressed, 1 case showed no significant change, and 15 cases showed signs of absorption (75%). After 15 days, 15 patients were followed up, and all the patients showed signs of absorption (100%). **Conclusion:** The imaging features of 2019 coronavirus disease infection are mainly ground-glass opacity shadow. Multiple lesions are common in both lungs, mostly in the subpleural area. Pleural effusion or pericardial effusion are rare, and there are no enlarged mediastinal and hilar lymph nodes. Gradual absorption begins 10–15 days after treatment.

Keywords 2019 coronavirus disease; viral pneumonia; adults; CT

自2019年冠状病毒病(2019 coronavirus disease, COVID-19)暴发以来,截至2020年3月4日全国累计确诊80 565例。COVID-19是 β 属的单股RNA新型冠状病毒。主要临床症状有发热、咳嗽、乏力、干咳,并随病情进展迅速发展为气促、呼吸困难,严重者出现呼吸窘迫综合征(acute respiratory distress syndrome, ARDS)^[1-2]。肺部CT检查可显示早期肺部病变,能早期辅助确诊。本研究分析经新型冠状病毒核酸检测确诊的患者胸部CT检查,旨在探索COVID-19的影像学特征,为临床医生诊断COVID-19提供一定参考。

1 对象与方法

1.1 对象

收集安徽医科大学第一附属医院2019年1月至2019年3月在全国COVID-19疫情暴发期间的20例住院患者,男10例,女10例,年龄29~71(46.8±11.7)岁,20例患者均经新型冠状病毒核酸检测阳性确诊;20例患者此次发病前均无明显肺部基础疾病;临床症状均出现发热、不同程度的咳嗽,最高体温达39.4℃;部分患者出现头痛、乏力、胸闷、心慌、肌肉酸痛等症状。

1.2 方法

采用GE 16或64排螺旋CT扫描仪对20例患者进行胸部CT扫描。患者扫描时取仰卧位,吸气后开始扫描,扫描范围自肺尖至肋膈角处,层厚、层距5 mm。为更好的显示细微病灶,扫描结束后

对数据进行0.625 mm薄层重建,并传至GE公司ADW4.7后处理工作站进行数据处理。所有图像由两名具有多年阅片经验的放射科主治医师进行观察分析,观察病变的分布位置,形态、密度、数量。并记录20例患者住院后不同时期复查胸部CT的病变吸收情况。

2 结果

2.1 COVID-19的流行病接触史及临床分型

20例患者,有14例有武汉居住史、旅行史或与武汉人员密切接触史;6例否认密切接触武汉相关人员病史。临床分型普通型18例,重型2例。

2.2 COVID-19的发病部位及影像表现

CT检查肺内表现散在多发病变19例(95%),单发病变仅1例(5%);14例(70%)双肺下叶同时受累(图1, 2)。19例(95%)患者发现散在斑片样磨玻璃影,并且病变大多临近胸膜下区,磨玻璃病变不遮盖肺纹理,磨玻璃影内肺纹理可见(图3)。20例患者共100段肺叶,其中58叶(58%)斑片样磨玻璃影病变,29叶(29%)斑片样实变影,9叶(9%)结节样高密度实变影;少部分患者肺内磨玻璃影及实变影共存,肺内可以伴有条索样纤维化灶及高密度结节(图4, 5)。重症患者主要以斑片样实变影为主,伴有少量磨玻璃影,并伴有胸腔积液(图6)。本组病例仅2例重型患者出现胸腔积液或心包积液征象。2例伴纤维化灶,6例伴胸膜增厚。所有病例未发现纵膈及肺门肿大淋巴结。

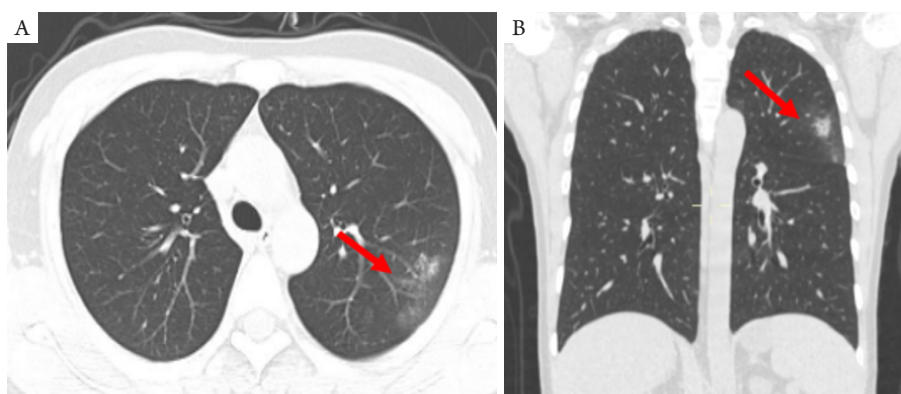


图1 病变为单发，仅累及左肺上叶。

Figure 1 Solitary lesion, only involving the upper lobe of the left lung

男，30岁，咽痛、发烧，最高体温37.5℃，咳嗽不明显，有明确武汉疫区接触史。在轴位及冠状位重建图像中见左肺上叶斑片样磨玻璃影，如图红色箭头所指。

Male, 30 years old, pharyngeal pain, fever, highest temperature 37.5℃, cough is not obvious, there is a clear history of exposure to Wuhan epidemic area. In the axial and coronal reconstruction images, the ground glass shadow of the left upper lobe was seen, as indicated by the red arrow.

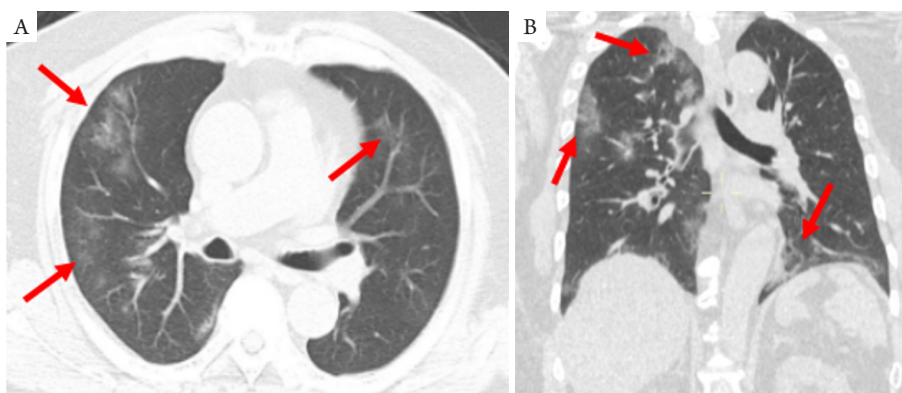


图2 两肺散在多发病变，多个肺叶受累

Figure 2 Two lungs scattered with multiple lesions, multiple lobes involved

男，62岁，突发腹泻后出现畏寒、发热，体温最高达37.4℃，继而出现干咳、胸闷，亲属有武汉疫区接触史。胸部CT轴位及冠状位重建图像可见两肺散在多发斑片样磨玻璃影，如图红色箭头所指。

Male, 62 years old, suffered from chills and fever after sudden diarrhea. The maximum body temperature was 37.4℃, followed by dry cough and chest tightness. His relatives had contact history in Wuhan epidemic area. On the axial and coronal reconstruction images of chest CT, we can see the ground glass shadow of two lungs scattered with multiple spots, as indicated by the red arrow.

2.3 病变的进展情况

住院治疗，5 d后复查胸部CT，8例患者病情进展，增多的实性成分大多分布在两肺下叶；增多的磨玻璃成分，开始向肺门方向进展，并且分布的肺叶逐渐增多(图7)，12例无明显变化，无1例有吸收征象。

10 d复查，4例进展，部分表现磨玻璃影密度增高，1例无明显变化，15例(75%)出现吸收征象，实性成分以及磨玻璃影吸收都比较明显(图8)。15 d后复查随访15例，5例患者未随访到CT检查，15例(100%)均表现吸收征象。

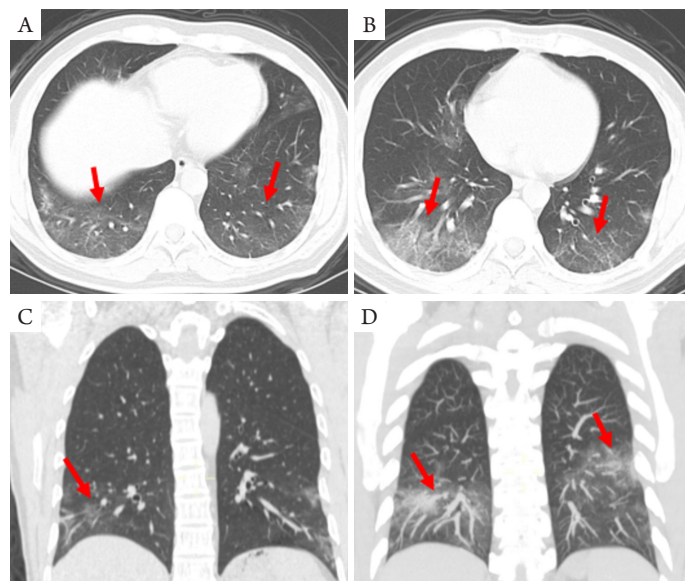


图3 两肺散在病变，以斑片样磨玻璃影为主，多集中在胸膜下区

Figure 3 Two lungs are scattered in lesions, mainly mottled ground glass shadow, mostly concentrated in the subpleural area

男，37岁，饮酒后出现咳嗽，干咳，少许白黏痰，继而出现发热，体温最高达38.6℃，伴全身乏力、肌肉酸痛。否认武汉人员接触史。两肺病变呈多发、散在特征，以斑片样磨玻璃影为主，并且病变多集中在胸膜下区，磨玻璃影内肺纹理清晰可见，如红色箭头所指。

Male, 37 years old, had cough, dry cough, a little white mucus phlegm after drinking, and then had fever. The maximum body temperature was 38.6℃, accompanied by general weakness and muscle ache. Deny the contact history of Wuhan personnel. The two lung lesions are characterized by multiple and scattered features, mainly patchy ground glass shadow, and the lesions are mostly concentrated in the subpleural area. The lung texture in ground glass shadow is clearly visible, as indicated by the red arrow.

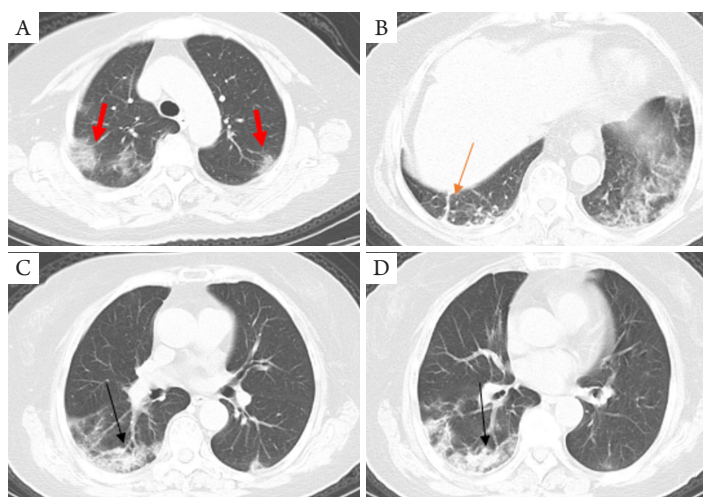


图4 肺内病变多样化，磨玻璃影及实变影共存，病变主要分布两肺胸膜下区

Figure 4 Various lesions in the lung, ground glass shadow and solid shadow coexist, mainly distributed in the subpleural areas of the two lungs

女，70岁，无明显诱因出现发热，最高体温37.9℃，伴有干咳、腹泻、全身酸痛。有武汉人员接触史。(A)两肺上叶胸膜下区散在斑片样磨玻璃影(箭头)；(B)右肺下叶伴纤维化灶(箭头)；(C, D)黑色细箭头所指，两肺下叶斑片样实变影，密度明显高于两肺上叶磨玻璃影(箭头)。

Female, 70 years old, no obvious inducement to fever, the highest temperature of 37.9℃, with dry cough, diarrhea, general pain. Contact history of Wuhan personnel. (A) Subpleural areas of the upper lobes of the two lungs are scattered with patchy ground glass shadows (arrow); (B) Right lower lobe of the lung with fibrosis (arrow); (C, D) Density of patchy consolidation shadow in the lower lobe of the two lungs are significantly higher than that in the ground glass shadow in the upper lobe of the two lungs (arrow).

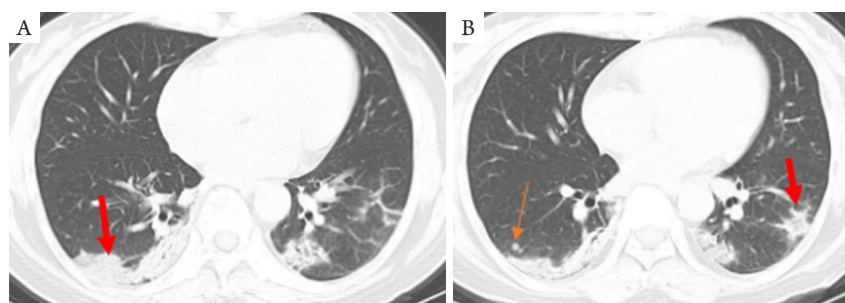


图5 病变以两肺散在斑片样实变影为主。

Figure 5 Lesions are mainly two lung scattered spot like consolidation

女, 49岁, 无明显诱因下低热, 体温约37.5 °C, 伴有咳嗽、全身乏力。否认接触武汉人员。两肺下叶斑片样实变影, 密度较高, 位于胸膜下区(粗箭头); 右肺下叶实性结节影(细箭头)。

Female, 49 years old, low fever without obvious inducement, body temperature around 37.5 °C, with cough and general fatigue. Denied contact with Wuhan personnel. The patch like consolidation shadow of the lower lobe of the two lungs, with high density, is located in the subpleural area (thick arrow), the solid nodular shadow of the right lower lobe of the lung (thin arrow).

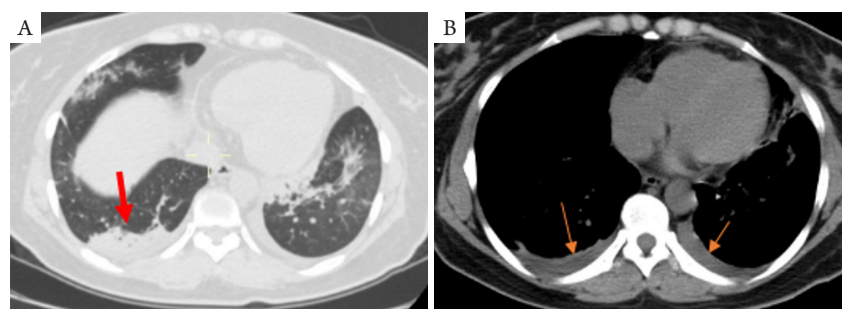


图6 两肺病变以实变为主, 并伴有两侧胸腔积液

Figure 6 Two lung lesions are mainly consolidation, accompanied by pleural effusion on both sides

女, 40岁, 畏寒发热, 最高温度为37.9 °C, 无咳嗽、咳痰。否认接触武汉人员。此患者临床分型为重型。右肺下叶斑片样实变影(粗箭头), 两侧胸腔积液(细箭头)。

Female, 40 years old, chilly and febrile, the highest temperature is 37.9 °C, no cough or expectoration. Denied contact with Wuhan personnel. The patient was clinically classified as severe. Consolidation of the right lower lobe (thick arrow), pleural effusion on both sides (thin arrow).

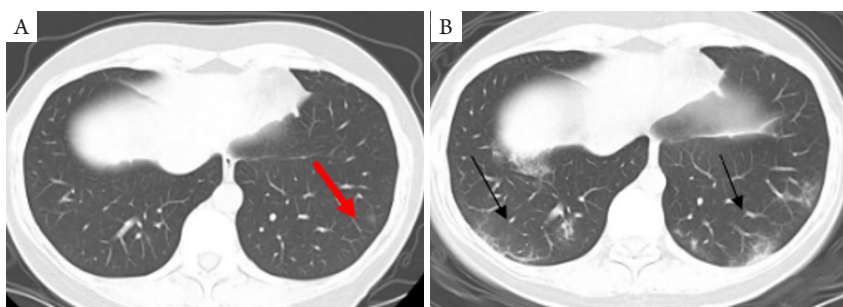


图7 患者5 d后复查, 病变范围明显进展

Figure 7 After 5 days of reexamination, the extent of the lesion progressed significantly

女, 34岁, 乏力不适后出现发热, 体温为37.8 °C, 无咳嗽、咳痰, 有武汉居住史。(A)发病初胸部CT, 仅在左肺下叶见少许斑片样磨玻璃影, 密度较淡(箭头); (B)5 d后复查胸部CT, 两肺下叶开始出现散在的磨玻璃影, 病变范围较(A)明显增多, 并且向肺门方向进展(箭头)。

Female, 34 years old, fever after fatigue and discomfort, body temperature of 37.8 °C, no cough and expectoration, living history of Wuhan. (A) At the beginning of the onset of the disease, only a few mottled ground glass shadows are seen in the left lower lobe of the lung, with light density, as indicated by the red thick arrow; (B) Reexamination of chest CT after 5 days, scattered ground glass shadow appeared in the lower lobes of the two lungs, the lesion area increased significantly compared with (A), and progressed to the direction of pulmonary hilus (arrow).

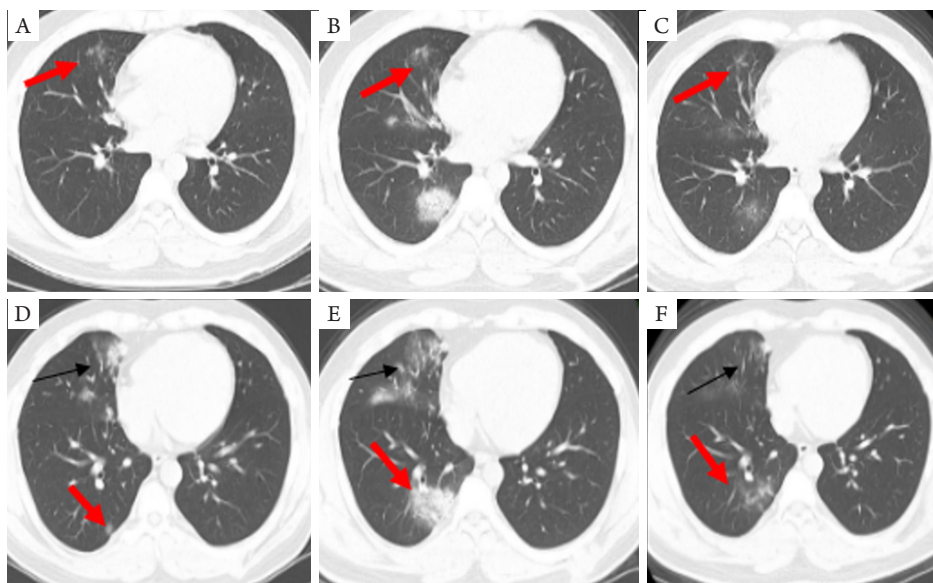


图8 患者10 d后复查, 病变范围明显吸收

Figure 8 After 10 days of reexamination, the lesion area was obviously absorbed

男, 29岁, 发热, 最高体温39.4 °C, 伴有乏力、纳差。有武汉人员接触史。(A~C)为患者发病初, 5 d, 10 d后胸部CT, 右肺中叶病灶5 d后增多, 10 d后有所吸收(红箭头); (D~F)发病初仅表现为结节样淡薄影, 5 d后明显增大, 10 d后吸收明显(红箭头)。黑箭头指病变5 d后增多, 范围变大, 10 d后吸收明显。

Male, 29 years old, fever, maximum body temperature 39.4 °C, with asthenia and poor appetite. Contact history of Wuhan personnel. (A~C) Chest CT at the beginning of the onset, after 5 days and after 10 days, the lesions in the middle lobe of the right lung increased after 5 days and were absorbed after 10 days (red arrow); (D~F) At the beginning of the onset, the lesions showed only light nodular shadow, increased significantly after 5 days and absorbed obviously after 10 days (red arrow). The lesions increased in 5 days and enlarged in scope, and were absorbed obviously in 10 days (black arrow).

3 讨论

新型冠状病毒是 β 属型冠状病毒, 有包膜, 直径60~140 nm。其基因特征与严重急性呼吸综合征冠状病毒(severe acute respiratory syndrome coronavirus, SARS-CoV)有明显区别。目前研究^[3]显示新型冠状病毒与蝙蝠严重急性呼吸综合征(severe acute respiratory syndrome, SARS)样冠状病毒同源性达85%以上; 新型冠状病毒感染者是主要的传染源, 无症状感染者也可以为传染源; 传染性较强, 可以通过飞沫、密切接触、气溶胶传播, 甚至粪便及尿液也具有一定的传播性^[4]。新型冠状病毒主要临床症状表现为发热、干咳、乏力, 少数患者会伴发咽痛、头痛, 肌肉酸痛, 腹泻等症状。本组20例患者均出现发热、不同程度的咳嗽症状。胸部影像检查是临床诊断COVID-19的重要方法, 在新型冠状病毒爆发流行期间, 对于早期发现肺内的病变, 进行积极的早期隔离和治疗, 对防止疾病扩散具有十分重要意义。

依据中华医学会放射学分会传染病学组发布

的《新型冠状病毒肺炎影像学诊断指南(2020第一版)》, 新冠肺炎依据发病时间和病程可分为早期、进展期和转归期, 不同时期的影像学表现并没有严格的分界, 具有一定的重叠性, 早期病变多表现为小斑片样磨玻璃影, 病灶多单发; 进展期病变进一步发展, 累及多个肺叶, 病变多发, 散在磨玻璃影以及斑片样实变影, 随着病情加重, 实变密度越来越高, 范围进一步扩散; 患者免疫力低下, 或者伴发多种基础疾病, 会加重病情进一步加重, 双肺实变进一步加重, 甚至出现“白肺”, 弥漫性实变为主, 随即出现呼吸窘迫综合征; 转归期病变吸收, 部分出现少量纤维化病灶^[5]。本组20例患者仅1例单发病变, 仅累及一叶肺, 影像学表现处于病变早期, 其余19例患者入院第1次CT检查均处于进展期阶段, 这跟患者最初出现症状至入院检查的窗口时间长短有密切关系, 本组患者就诊时间距离出现症状7 d以上的有17例; 本组未出现一例“白肺”患者, 2例临床分型为重型的患者, 也并未出现影像学典型的“白肺”变现, 可能跟及时、正确的综合治疗有一定

的相关性。CT检查对新冠肺炎的诊断及分期具有重要的价值。国家卫生健康委员会《新型冠状病毒肺炎诊疗方案》(试行第五版)中就把CT检查纳入临床诊断的依据^[6]。

本组COVID-19的患者有高达19例患者同时累及两侧肺,病变呈现多发的特征,仅1例患者出现单侧单发病变;此例患者在出现发热的第4天即被核酸检测确诊,可能就诊及时,肺炎病变处于早期,仅表现为肺内单发斑片样磨玻璃影。武汉大学中南医院钟飞扬等^[7]的研究表明COVID-19病灶多位于双肺,达70%;与本研究结果基本一致,新冠肺炎病灶多累及双肺,并且病变散在多发。本研究19例(95%)患者肺部出现了斑片样磨玻璃影,并且病变大部分分布在胸膜下区,20例患者共200段肺叶,其中出现磨玻璃病变的肺叶共58叶,高达58%,出现片状实性病变的肺叶仅有29叶,仅占29%。钟飞扬等^[7]研究表明新冠肺炎磨玻璃影发病率高达100%,实变率达63%;本研究结果与其基本保持一致,研究表明新冠肺炎磨玻璃影发生的概率远大于实变影发生的概率。Wu等^[8]对80例新冠肺炎的影像学研究表明:最常见的CT异常为磨玻璃影(ground-glass opacity, GGO)发病率为91%、实变的发病率为63%,病变多为散在多发,平均累及12~6个肺段。最常累及的肺段是下叶背段(86%),与本研究结果一致。Kanne等^[9]对21例COVID-19感染患者的研究发现,CT扫描显示其中12例(57%)为毛玻璃样阴影,6例(29%)为毛玻璃样阴影和实变。15例(71%)患者有两个或两个以上的肺叶,16例(76%)患者有双侧病变。多项研究结果显示新冠肺炎病变散在多发,大多累及多个肺叶或肺段,以磨玻璃影为主,实变影发生率小于磨玻璃发生率。本组20例新冠肺炎患者仅有2例患者出现胸腔积或心包积液,并且这两例患者均为重型COVID-19,此2例患者合并出现了细菌感染,跟胸腔积液和心包积液的出现可能具有一定的相关性。本组研究所有病例均未发现有肿大淋巴结出现。

COVID-19与SARS表现相似,主要是以磨玻璃影及实变影为主要影像学特征,早期可以仅仅表现为肺部单发的淡薄磨玻璃影,随病情进展,磨玻璃影范围增多,位于多个肺叶及肺段,病变分布于胸膜下区,重型患者随着病情加重可以出现大量实变影,甚至“白肺”;SARS的影像学特征表现为,肺内炎性浸润病灶密度很淡,以云雾状、磨玻璃样改变为主,常伴有斑片状或大片状实变阴影,病灶内可见肺纹理穿行和空气支气管征;病变常为双侧

或多肺叶病变,影像特点并无明显特异性。本组研究发现COVID-19与SARS以及流感病毒性肺炎影像学表现具有很多重叠,缺乏一定的特异性,就影像学表现两者不易鉴别^[10-11]。COVID-19的影像学表现与其他类型的病毒性肺炎同样具有一定相似,例如流感病毒性肺炎的CT影像有多种表现的磨玻璃密度影,病灶的范围不受肺段限制^[12-13],与本组新冠肺炎的影像学表现有一定的重叠性,鉴别诊断具有一定困难。但是COVID-19与细菌性肺炎影像学表现具有一定的差别,细菌性肺炎多见于中下肺叶,肺段或肺叶实变,密度均匀,很少有磨玻璃影出现^[14];而COVID-19主要以磨玻璃影为主。

本组病例在入院积极治疗5 d后复查的胸部CT,发现7例明显进展,肺内病变增多,无一例患者出现明显吸收征象。治疗10 d后复查胸部CT发现15例(75%)出现吸收征象。治疗15 d后本组随访到的病例均匀出现吸收征象,高达100%,本研究发现COVID-19,诊断及治疗积极、正确的情况下10~15 d开始逐步出现吸收。研究^[11]报道SARS病变的高峰期在起病后第2周,如果治疗及时第3周开始出现吸收,约1个月消散;本组患者在治疗后约2周开始出现吸收好转,比SARS提前约1周,可能原因为本组病例大多为普通型,仅2例为重型;另外大部患者住院就诊及时,并且在治疗的过程中加入了中医辨证辅助治疗,增强了患者的免疫力,这些因素可能会进一步加快患者的转归及吸收速度。

总之,COVID-19 CT影像学检查具有一定的特征性,主要以磨玻璃影为主;两肺常见多发病变,病变多分布在胸膜下区;少有并发胸腔积液或心包积液,不伴有纵膈及肺门肿大淋巴结;影像学表现与其他病毒性肺炎具有一定的重叠性,仅靠影像学检查鉴别病毒性肺炎类型具有一定的困难。然而结合患者流行病学史,对COVID-19早期诊断其特征性CT影像表现依然具有较高的参考价值。

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