ORIGINAL ARTICLE

ATYPICAL PNEUMONIA IN IMMUNOCOMPROMISED PATIENTS HRCT EVALUATION

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ABSTRACT

Atypical pneumonia is commonly found in immunocompromised patients, typical pathogens include chlamydia, mycoplasma, legionella, pneumocystis carini, viruses, fungi, and rickettsia. As serological diagnosis takes several days for confirmation radiology is expected to provide prompt evidence of atypical pneumonia.

This is a retrospective study, conducted during the period of 8 years from May 2004 to April 2011. HRCT was done in all the patients coming with suspicion of atypical pulmonary infection having complaints of fever, dry cough and weight loss. Most of the patients were known case of end stage renal disease, post renal transplant or having some neoplastic disorder. Diffuse ground glass haze with linear and reticular shadowing was found to be the predominant finding in patient with pneumocystis carini infection. Bronchial wall thickening and centrilobular nodules were frequently seen in mycoplasma pneumoniae pneumonia. Areas of segmental consolidation, reticular or linear opacity, patchy ground glass haze and bronchial wall thickening were associated with chlamydia pneumoniae pneumonia. Milliary nodules were the characteristic appearance in varicella zoster infection. Segmental consolidation and bilateral pleural effusion were seen in legionella infected patients.

Key words: Atypical pneumonia, consolidation, ground glass opacity. Linear and reticular opacity.

Introduction

The term atypical pneumonia was formerly used to label the pneumonia with atypical clinical, laboratory, and radiological findings but now a day's atypical pneumonia is mentioned to the pneumonias caused by the pathogens which are difficult to isolate. Affected patients include those with immunodeficiency, chronic debilitated diseases or on long term antibiotic therapy. Typical pathogens include Chlamydia, Mycoplasma, Legionella, Pneumocystis, viruses, fungi, and Rickettsia.

The correct diagnosis of atypical pneumonia is clinically important because atypical pneumonia requires a different treatment strategy than usual bacterial pneumonia.[3] Although the clinical picture of atypical pneumonia is to some extent changed than that of usual bacterial pneumonia, this difference is often not classic for differential diagnosis.[4] The serologic diagnosis usually requires several days and cannot be completed in time for conclusion making of initial medication, which is important to the treatment of community-acquired pneumonia. Hence, radiologic examinations are expected to give information about the differential diagnosis of pneumonia and its degree of involvement.

Renal transplantation is the most frequently done organ transplantation. Much progression in the survival of the transplanted kidney has been made in the previous two decades, especially since the introduction of immunosuppression drugs but; infection is a major complication among renal transplant recipients, inclu-

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ding pneumonia, one of the most common life threatening complications of long-term immunosuppression. A broad spectrum of pathogens is involved, of which the most frequent are bacterial and opportunistic infections.[1,2]

Pneumocystis carinii causes infection in immunocompromised patients such as those with organ transplant, primary immunodeficiency, malignancy or patients having AIDS. About 5-10% renal transplanted patients were observed to acquire pneumonia due to P. carinii. This frequency become greater in those on cyclosporine[5] and the period between 1 and 6 months is the of greatest risk to develop P. carinii pneumonia.

Cytomegalovirus (CMV) is the most frequently encountered pathogen in renal transplant recipients in countries with a temperate climate[5] about two thirds of transplant recipients show evidence of infection, but clinical disease develops in a much smaller number.

The purpose of this study was to clarify the HRCT pattern of different atypical pneumonias which can affect the renal transplant recipients or other chronically debilitated patients and to stratify whether the radiographic findings could discriminate these pathogens.

Material and Methods

This is a retrospective study conducted during the period of 8 years from May 2004 to April 2011 in radiology department of Sindh institute of urology and transplantation. HRCT was done in all the patients coming with suspicion of atypical pulmonary infection. As our institute is a transplant center and we come across a number of complications in post renal transplant patients so we incorporated chest CT into the routine work-up of patients suspected of having pneumonia. Patients usually presented with complaints of fever, dry cough and weight loss. About 35 patients were entered in this study. Most of the patients were known case of end stage renal disease, post renal transplant or having some neoplastic disorder.

Patients with underlying noninfectious primary pulmonary pathology or having pulmonary metastasis were excluded from this study and the data was collected through electronic data retrieval system.

Two radiologists with at least 10 year's experience were independently reviewed the HRCT findings of patients diagnosed of having atypical pneumonia. they evaluated the presence of consolidation, ground-glass opacity (GGO), nodules, pleural effusion, lymphadenopathy, reticular or linear opacity and airway dilatation on HRCT scans of those patients. They also determined unilateral or bilateral involvement of lung fields by the disease.

Consolidation was referred as airspace opacification with obscuration of the underlying vascular markings. Bronchial wall thickening was defined as thickening of bronchovascular bundle.

Ground glass opacity (GGO) was defined as slightly increased attenuation without obscuring the underlying vasculature. GGO was further classified as diffuse or patchy opacity. Minimal GGO at the periphery of consolidation were ignored. Nodules were classified into three types that is, centrilobular nodules, which were defined as small nodules in a centrilobular location; peribronchovascular nodules, which were defined as relatively larger nodules that were associated with the bronchovascular bundles; and random nodules, which were defined as nodules that were not associated with centrilobular structures or bronchovascular bundles. Lymphadenopathy was only mentioned if the shortest diameter of lymphnode was equal to or larger than 10cm. The reticular or linear pattern was described as lines, either due to interlobular or intralobular septal thickening. Airway dilatation was considered to be present if the bronchial diameter exceeded that of the adjacent pulmonary artery.

Statistical Analysis

A commercially available software program (SPSS, version 11.0.1; SPSS, Chicago, Ill) was used for statistical analysis. The frequency of the HRCT findings, as well as the prevalence of unilateral and bilateral pneumonia was also calculated. The average age of the patients was determined. The association between the HRCT findings and the pathogenic diagnosis was found using the chi square test.

Results

Among the 35 patients two patients were found to have underlying interstitial lung disease in addition of fungal infection. One of them showed linear and reticular shadowing with patchy areas of consolidation and other showed patchy ground glass haze along with bilateral pleural effusion and centrilobular nodules some of them showing cavitation.

Unilateral involvement was found in only 6 cases and bilateral involvement of lung parenchyma was seen in 29 cases. Out of 35 patients 68.6% (n=24) were male and 31.4% (n=11) were female having mean age of 34 years. Most of the patients i.e. 60% presented with complain of weight loss.

Among 35 patients entered in the study 34.3% (n=12) were having pneumocystis carinii infection, 28.6% (n=10) had mycoplasma pneumoniae, 5.7% (n=2) had legionella, 8.6% (n=3) presented with chlamydia infection 5.7% (n=2) had varicella zoster infection, 11.4% (n=4) had cytomegalovirus infection however nonpathogenic cause with fungal infection was found in 2 patients.

Out of the 12 patients having pneumocystis carinii infection all had diffuse ground glass haze, 11 showed linear and reticular shadowing and one patient demonstrate randomly distributed nodules along with diffuse ground glass opacity.

Mycoplasma pneumonia was seen in 10 patients. All patients had consolidations and reticular shadowing followed by the presence of centrilobular nodules which were seen in 8 patients.

Areas of segmental consolidation, reticular or linear opacity, patchy ground glass haze and bronchial wall thickening were found in all patients with chlamydia pneumoniae pneumoni however air way dilatation was found in 2 out of 3 patients having chlamydia pneumoniae infection.

Milliary nodules were revealed in 2 patients infected with varicella zoster virus.

2 were patients were diagnosed of having legionella infection. Segmental consolidation and bilateral pleural effusion were seen in both legionella infected patients however one of the patient also demonstrated linear and reticular shadowing.

Pathological Diagnosis	consolidation		Total
	segmen-tal	no conso-lidation	
Pneumocystis Carini	0	12	12
Mycoplasma	10	0	10
Legionella	2	0	2
Chalamydia	3	0	3
Varicella	0	2	2
No Pathogen	2	0	2
Cmv	4	0	4
Total	21	14	35

Table 1: Pathological Diagnosis *consolidation Crosstabulation Count

Pathological Diagnosis	ground glass opacity			Total
	diffuse	patchy	no ground glass haze	
Pneumocystis Carini	12	0	0	12
Mycoplasma	1	2	7	10
Legionella	0	0	2	2
Chalamydia	0	3	0	3
Varicella	0	0	2	2
No Pathogen	0	2	0	2
Cmv	0	4	0	4
Total	13	11	11	35

Table 2: Pathological Diagnosis *ground glass opacity Crosstabulation Count

Pathological Diagnosis	linear and reticular opacity		Total
	Yes	No	
Pneumocystis Carini	11	1	12
Mycoplasma	10	0	10
Legionella	1	1	2
Chalamydia	3	0	3
Varicella	0	2	2
No Pathogen	0	2	2
Cmv	4	0	4
Total	29	6	35

Table 3: Pathological Diagnosis *linear and reticular opacity Crosstabulation Count

Discussion

A study conducted to establish the most frequent diagnosis associated with widespread ground-glass opacity on CT by Rosita M. Shah et all demonstrated that among the atypical pneumonias presenred with groung glass opacification 66% were diagnosed of having pneumocystis carinii infection microbiologically.[6] Our results also evaluated that diffuse ground

glass opacity is the predominant finding in patients having pneumocystis carinii infection. We found that C pneumoniae pneumonia has a wide spectrum of HRCT findings that consist of segmental consolidation, linear and reticular shadowing air way dilatation and bronchial wall thickening. McConnell et al[7] noted that areas of alveolar opacity were more common in patients with primary chlamydia pneumoniae infection.[7] Segmental consolidation with reticular and linear opacity were commonly seen in both chlamydia and mycoplasma pneumonia without a significant difference. However bronchial wall thickening and air way dilatation is more commonly associated with chlamydia pneumoniae pneumonia. Nambu et al. described that the difference in frequency of bronchovascular bundle thickening and peribronchovascular or centrilobular nodules between *M. pneumoniae* and *S. pneumoniae* was statistically significant.[8]

There are some Limitations of our study we did not categorize the infections into primary and recurrent or chronic infection. We did not include pediatric patients. We didn't categorize the involment by the pathogens separately in organ transplanted patients, patient with chronic renal failure, primary immunodeficiency or malignant patients.

Conclusion

We have concluded that having knowledge about the HRCT patterns of different pathogens causing atypical pneumonia can help in reaching the diagnosis of atypical pneumonia and assist in prompt decision making.

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