ORIGINAL ARTICLE

ROLE OF CHEST XRAY IN ASSESSING THE SEVERITY IN H1N1 INFLUENZA CASES

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ABSTRACT

Introduction: Chest x-rays may play an important role in the diagnosis and treatment of H1N1 influenza by predicting which patients are likely to become sicker-who may be treated on out patient basis; who may need short duration of hospitalization; -who may need Intensive critical care viz. ventilator support

Methodology: We retrospectively studied 130 patients with H1N1 influenza infection. The most common abnormality was consolidation in the lower zones (46/130) followed by multiple zonal involvement (41/130). Although a normal chest x-ray did not exclude the possibility of an adverse outcome, the study's findings can help physicians better identify high-risk H1N1 patients who require close monitoring.

Result: The most common abnormality was consolidation in the lower zones (46/130) followed by multiple zonal involvement (41/130). On follow up 18 patients expired. Seropositive patients had predominant lower zone involvement While Patients with unizonal involvement has better outcome.

Keywords: Swine Flu(H1N1), Symptoms, Chest Xray

INTRODUCTION

Swine influenza (H1N1) is a very contagious respiratory infection and World Health Organization (WHO) has raised the alert level to phase 6 (pandemic). The study of clinical and X ray imaging findings helps in its early diagnosis.[1,2]

The new H1N1 influenza infection or the swine flu is a very contagious respiratory tract infection which came to attention in Mexico in April 2009.[1]. Since then it has rapidly spread in different countries and the World Health Organization (WHO) raised the alert level to phase 6 (pandemic level) by June 2009.[1]

Although most patients have mild symptoms and those with severe symptoms (sepsis, pneumonia, ARDS) mostly had an underlying disease, it was recognized that H1N1 may affect young previously healthy individuals and unlike other subtypes of influenza may cause severe symptoms in this age group. [2]

A case fatality rate (CFR) of 0.45% has been reported for this infection. [3] The patients may have different flu like manifestations such as fever, cough, sore throat, body aches, nausea and vomiting. The recognition of the pulmonary manifestations and radiologic features helps in early diagnosis, treatment and isolation of patients in order to prevent the spread of this very contagious respiratory tract infection. Several studies have been conducted in order to obtain information regarding the chest X-ray and computed tomography (CT) scan findings and correlation of these manifestations with disease severity has been made. The most common radiologic findings were the opacities observed in the lower lung zones. [1,3,4]

In H1N1, as in various types of community-acquired pneumonia, initial chest x-rays may not show abnormalities that develop later in the course of the disease. Further x-rays should be performed according to the patient's clinical course

METHODOLOGY

In this retrospective study, the files of confirmed H1N1 positive patients with clinical history and examination findings were studied and followed. Pattern and extent of involvement were studied and number of hospitalizations and critically ill patients were followed. Critically ill patients in-

cluded in this study are the patients who have been on ventilator support any time during their hospital stay and ambulatory patients comprises the other group. Ninety Five patients had a postero-anterior chest radiograph and five patients had an antero-posterior chest radiograph.The radiographs were obtained with 'ALLANGERS X-RAY MACHINE 300mA, MODEL NUMBER – ALLENGER /MARS 30'

Whenever a previous radiograph was available, the new chest X-ray was compared to the previous one and if a new abnormality was presents it was defined and recorded. The radiographs were studied regarding being normal or abnormal; unilateral or bilateral involvement and the pattern of involvement including ground glass, consolidation, reticulation and nodules. Ground glass opacities were considered when the background vascularity could be observed and consolidation when the underlying vascularity could not be observed. The presence of bilateral or unilateral lymph node enlargement in the mediastinum or hilum as well as bilateral or unilateral pleural thickening or effusion was assessed.[9]

The distribution of abnormalities was evaluated to be predominantly central, peribronchovascular or peripheral and focal, multifocal or diffuse. The distribution was also assessed in different lung zones by dividing into predominantly upper, middle or lower lung zone involvement. This was done in the frontal view with each lung divided into one thirds from the apex to the hemi diaphragm. The extent of lung zone involvement was compared in patients of different category and compared according the duration of the stay of patients.[8]

RESULT

It was seen from the study that Seropositive patients had predominant lower zone involvement; Critically ill patients shows multizonal involvement.; Patients with unizonal involvement had lower mortality and has better outcome.

Five patients who were seropositive had normal chest x-ray. Seven seropositive patients had co existing tuberculous lesion in chest xray. Patients having co-existing tuberculous lesion had a more serious initial course but a better final outcome as these patients responded very well to anti tuberculous therapy

Out of total seropositive patients, 112 were alive and 18 were died.

Table 1: Zonal involvement in Swine flu positive patients (n=130)

Zonal involvement	Sero positive
Lower zone	46
Bilateral lower zone	23
Mid zone	18
Mid+lower zone	18
Upper zone	13
Normal chest xray	5
TB+Consolidation	7

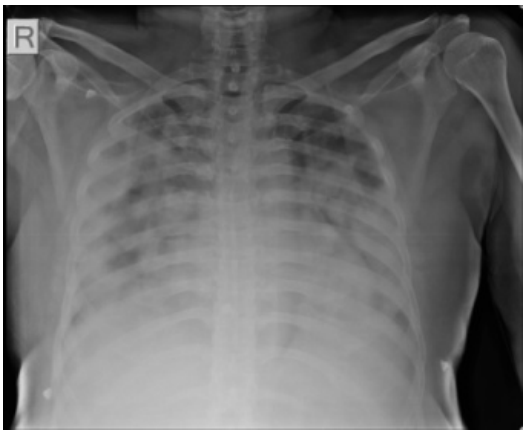

Fig 1: Swine flu positive patient with mid and lower zone involvement

Fig 2: Swine flu positive patient with left lower zone involvement

Table 2: Survival of seropositive patients according to severity of disease

Indoor	Seropositive	Death	Alive
Critically ill patients (viz. patients on ventilator support)	58	13	45
Ambulatory patients	72	5	67

Table 3: Critically ill patients with ventilator support

Zonal involvement	Seropositive	Death	Alive
Lower Zones	11	1	10
Bilateral lower zones	11	4	7
Mid zone	8	1	7
Mid lower zone	15	6	9
Upper zone	6	0	6
TB + Consolidation	7	1	6
Normal chest xray	0	0	0

Table 4: Ambulatory Patients

Zonal involvement	Seropositive	Death	Alive
Lower Zones	35	1	34
Bilateral lower zones	12	2	10
Mid zone	10	0	10
Mid lower zone	3	2	1
Upper zone	7	0	7
TB + Consolidation	0	0	0
Normal chest xray	5	0	5

DISCUSSION

By the end of April 2009, two cases of confirmed novel H1N1 were detected in the United States. These patients were resistant to rimantadine and amantadine and had no contact with swine. Further cases of the new swine flu were identified in Mexico and other countries. By June 2009, several confirmed cases were reported from 74 countries and the virus was known to have human to human transmission and by that time WHO raised the alert level to phase 6 which is the pandemic level.[5] The H1N1 influenza is a negative-sense RNA virus of the orthomyxoviridae family. The center for disease control and prevention (CDC) recognizes it with influenza like syndrome presenting with high fever, cough or sore throat.

H1N1 seropositive patients come under following categories:

Cat A –Mild fever, cough, sore throat with or without headache, bodyache, diarrhea, vomiting.

Cat B1 – Symptoms of category A plus high grade fever + severe sore throat

Cat B2 –symptoms of category A plus High Risk Group women, patients >65 yrs., patients with underlying lung disease heart disease, kidney diseas, cancer, HIV/AIDS

Cat C –Symptoms of category A and B plus following

Breathlessness, Chest pain, Drowsiness, Low BP, Sputum with blood

Bluish discoloration of nail, irritable child, worsening of underlying medical disease.[6]

Its diagnosis is confirmed by real-time reverse transcription polymerase chain reaction PCR or viral culture. Its incubation period is between 1 and 7 days. The patients are thought to be contagious from one day before to 7-10 days after the onset of the disease. Patients with a background disease including respiratory tract and heart disease are more likely to require hospitalization. The clinical presentations have been reported as fever, headache, sore throat, dyspnea, diarrhea and rhinorrhea. Laboratory findings are high CPK, high LDH and lymphopenia.[1]

The new swine flu influenza S-OIV is known to be susceptible to neuraminidase inhibitors and there is recommendation to give oseltamivir as prophylaxis to the high risk group.[2] Different radiologic manifestations have been reported in several studies of the new swine flu influenza virus.[4,6]. Perez Pallida[1] reported the radiologic manifestations of 18 patients with documented H1N1 infection as bilateral alveolar opacities which are predominantly basal and other observations being interstitial opacities (including linear and reticular). In a study on 66 patients, the most common abnormal pattern was consolidation most commonly observed in the lower and central lung zones and patients admitted to the ICU were more likely to have three or more lung zones involved.[4] This result was consistent with our study. The patients were more Imaging Findings in H1N1 Influenza A Infection Bakhshayeshkaram M et al likely to have consolidations in the lower lung fields and those admitted to the ICU having two or more lung fields involved; however, in another study by Aviram et al[7] performed on 97 patients who underwent chest radiography at admission, the most frequent abnormal pattern on radiography was ground glass opacities in the central and middle lung zones, which was followed by consolidation with slightly less frequency. This is in contrast with our findings which showed predominant involvement of the lower lung zones and consolidation as the most common manifestation. In their study, patients with bilateral and peripheral involvement or four or more lung zone involvement were more likely to have severe outcome, which is in consistence with our findings in critically ill patients. It should be noted that our study population included subjects suspected as having H1N1 virus infection on the basis of clinical examination findings and clinical history of the subject.

India reported its first case of Novel 2009 influenza A (H 1N1) virus in may 2009 and subsequently, it was diagnosed all over the country within a short period of time. First case in Pune (Maharashtra) was reported in August 2009 and since then Novel 2009 influenza A (H1N1) infection had significantly affected the population. Many patients needed ICU management or critical ambulatory support and close monitoring in Swine flu Isolation ward.[8]

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