

Opaque Hemithorax: Re-Visiting The Causes

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Citation

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Abstract

Background: Whitening out of half of the lung field on a chest x-ray is known as Opacification of a hemithorax and its presence usually indicates a significant disease in patient. This study was done with an aim of finding different etiologies as the cause of complete opacification of a hemithorax on chest radiograph. **Methods:** A prospective study of patients whose Chest radiograph had opaque hemithorax were included and after clinical and laboratory investigation of these patients the diagnosis responsible for the complete opacification of half the lung field in chest X-ray was recorded. **Results:** A Total of 104 patients (69 males and 34 females) were enrolled for the study. Out of 100 patients 62 involved left and 42 involved right hemithorax. 74 patients had massive pleural effusion, 19 had destroyed lung secondary to tuberculosis, 8 had lung consolidation and 3 had collapse due to lung mass. Of 74 patients of pleural effusion 46 were diagnosed as empyema, 22 as malignant effusions and 6 as tubercular pleural effusion. Mediastinal shift to contra lateral side was seen only in 40 out of 74 patients having massive pleural effusion. **Conclusion:** Massive pleural effusion was found as most common etiology in our study. Other rarer causes that may present as opaque hemithorax could not be found in our study. A larger study may be done to find out the prevalence of these rare differential diagnoses of opaque hemithorax in chest radiograph

BACKGROUND

Chest radiograph is the most basic and most informative investigation in a patient suffering from any respiratory ailment, hence is most of the time the first investigation being advised for these patients. A chest radiograph may help in reaching to a diagnosis in most of the patients suffering from diseases of thorax that can be parenchymal, pleural, mediastinal and some time of chest wall also. Whitening out of half of the lung field on a chest x-ray is known as Opacification of a hemithorax. Complete Opacification of a hemithorax indicates presence of a significant disease, as the involved lung at the side of opaque hemithorax shall not be participating in the physiological functions. A differential diagnosis of opaque hemithorax may list congenital anomalies, inflammatory and neoplastic disorders, and even post surgical cause. The aim of the present study was to identify different etiologies in patients having opaque hemi-thorax on chest X- ray.

MATERIAL AND METHODS

>This was a hospital based prospective study that was conducted in a tertiary-care referral institute of pulmonary medicine and tuberculosis in Delhi by studying the clinical & laboratory investigations of admitted in- patients between

February 2006 to March 2007. The medical records of the patients admitted as in-patients were reviewed. The institutional review board approved the study.

STUDY SUBJECTS

Posterior-anterior view of chest radiograph of all the admitted patients was seen and the cases having opaque hemithorax on these x ray chests were segregated to be included in study. Patients of all ages and both genders were included in the study

PARAMETERS STUDIED

Among the selected medical records of the cases following parameters were looked and recorded for the study

- (a) Age of the patient
- (b) Gender of patient
- (c) Smoking status of patient; whether a smoker or a non smoker
- (d) Final diagnosis (Reached after clinical and laboratory findings)

The Chest X- rays were studied in detail for additional

parameters such as, the side of thorax involved, presence of mediastinal shifts and if present, the side of this mediastinal shift and the involvement of the contra lateral lung. A single observer studied the chest radiographs for recording X-ray parameters to avoid inter-observer variation in results.

The data collected was entered using a personal computer on a Microsoft excel sheet. This collected data was analyzed on a personal computer for frequency distribution.

RESULT

Total 104 patients of opaque hemithorax in x-ray chest were included in this study. Sixty nine patients were male and 35 were female. Fifty three patients were in age group 20 to 40 years, 36 patients were above age of 40 years, and only 15 were under age of 20years. In male patients, 42 patients had involvement of left hemithorax and 27 patients had involvement of right hemithorax. In the female patients, 20 involved left hemithorax and 15 involved right. It means out of 104 patients 62 involved left, and 42 involved right hemithorax. The underlying cause of opaque hemithorax on X-ray was most commonly pleural effusion, which accounted for 74 patients. Nineteen patients had destroyed lung, 8 had lung consolidation and 3 had collapse due to lung mass. Of these 74 patients of pleural effusion, 20 had mediastinum placed central in position. Mediastinum was shifted to contralateral side in 40 patients, and to ipsilateral side in 14 patients. Of 19 patients of destroyed lung, all had mediastinum shifted to same side. All patients of consolidation had mediastinum central in position. Two patients of lung mass had mediastinum shifted to contralateral side and to the ipsilateral side in 1 patient. Table 1. Shows mediastinal position in different etiologies in the study.

Thirty patients also had involvement of contra-lateral lung. All the 19 patients with destroyed lung also had involvement of contralateral lung.10 patients of empyema had some lesions in the opposite lung, and 2 patients with malignant pleural effusion had involvement of contralateral lung in the form of enlarged mediastinal lymph nodes. Of 74 patients of pleural effusion 46 were found to have empyema, and in them most (34) patients were below 40 years of age. Malignancy was found in 22 patients and most (18) of them were below 40 years. Tubercular pleural effusion was found in 6 patients, and most of them (5) were below age of 40. In majority of patients with massive pleural effusion the mediastinum was shifted to the contralateral side. (Table 2.)

Figure 1

Table 1. Position of mediastinum on chest radiograph in different etiologies

Etiologies	Central	Ipsilateral	Contralateral
Pleural effusion	20	14	40
Lung mass	0	1	2
Destroyed lung	0	19	0
Consolidation	8	0	0
TOTAL	28	34	42

Figure 2

Table 2. Mediastinum position on chest radiograph in massive pleural effusions

Mediastinal position	Tubercular effusion(N=6)	Empyema (N=46)	Malignant effusion (N=22)
Central	Nil	17	3
Ipsilateral	2	7	5
Contralateral	4	22	14

DISCUSSION

Complete Opacification of a hemithorax seen on a posterior anterior radiograph of Chest usually indicates presence of extensive disease. The diagnosis in such cases may be quite variable and the differential diagnosis extends from congenital conditions to inflammatory, infective and malignant conditions.

Agenesis of Lung is a type of congenital abnormality that results due to failure of development of primitive lung bud, may also present as completely opaque hemithorax. Many other congenital abnormalities, such as sequestration of lung and lung aplasia also may be seen as opaque hemithorax on Chest radiograph, and. these congenital anomalies, although may present any time after birth, but usually presents in children under five years of age. Few patients who have no or mild associated anomalies may survive into adulthood.(1), The left lung is affected more frequently than the right in congenital conditions and the majority of cases exhibit other congenital abnormalities also, in which patent ductus arteriosus is one of the most common association (2,3,4). Although Chest radiograph being a preliminary investigation, the diagnosis of these conditions requires further investigations to confirm the presence of these congenital lung condition. The exact diagnosis in earlier days were established using invasive procedures like bronchography and pulmonary angiography(5),but with advent of non invasive imaging techniques, especially the CT thorax, the exact diagnosis can now be established without opting for invasive procedures, therefore, CT scanning of Chest in such cases has now become the investigation of choice after chest radiograph. Many times

these young patients of lung aplasia may be mistaken for fibrotic lung disease subsequent to pulmonary tuberculosis and may receive anti tuberculous therapy erroneously, especially in countries where tuberculosis is common.

Massive pleural fluid collections also present as opaque hemithorax. Hydrothorax, pyothorax, haemothorax and chylothorax which are common in males and on the right side) may be visible as opaque hemithorax on chest radiograph.

Pleural effusion may be caused due to varied etiologies and tuberculosis and malignancies are the two commonest causes encountered in massive pleural effusions. Massive pleural effusions may result in contra lateral mediastinal shift in approximately 15% to 25% of cases (6,7). In a study⁸ of 766 patients of pleural effusion, Porcel and Manuel had found that 93 patients (12%) exhibited massive pleural effusions and most of these pleural effusions were unilateral (98%). Somewhat more than a half of large or massive pleural effusions (89 of 163 pleural effusions; 55%) were related to malignancies. In another study, among massive effusions, malignancy was most frequent (38%) (9). In one series from Baltimore, 42% of 102 exudative pleural effusions were due to malignant disease (10). In an epidemiologic study from the Czech Republic, malignancy accounted for 24% of all the pleural effusions (11). In our study, massive pleural effusion was cause of opaque hemithorax in 74 patients and among them malignant pleural effusion was present in 22(30%) patients. Empyema (46; 62%) and tubercular pleural effusion (6; 8%) was the diagnosis in rest of the patients with pleural collections in this study. Para pneumonic effusions and tubercular effusions are most common cause of empyema in developing world. Pleural effusions associated with pneumonia account for a large percentage of pleural effusions and as many as 40% of hospitalized patients with bacterial pneumonia may have an accompanying pleural effusion (12). Extensive consolidation due to pneumonia in unilateral lung may also be sometime seen as opaque hemithorax. The morbidity and mortality rates in patients with pneumonia and pleural effusions are higher than those in patients with pneumonia alone. In one study of patients hospitalized with community-acquired pneumonia, patients with pleural effusions were 2.7 times more likely to be treatment failures than were those without pleural effusions (13). In high prevalence countries, tuberculosis should always be suspected whenever a pleural effusion is detected and it is still a leading cause of pleural effusion in developing countries.

Extensive fibrosis of unilateral lung visible radiologically as destroyed lung may also present as opaque hemithorax in patients of extensive tuberculosis. In our study 18 patients had opaque hemithorax on chest radiograph due to destroyed lung from tuberculosis.

Depending upon the age, presence of risk factors such as, smoking and signs and symptoms such as, haemoptysis, hoarseness of voice, clubbing, a suspicion of malignant pleural effusion can be made, so that the patient is investigated to detect the underlying malignancy. Lung cancer is the leading cause of malignant pleural effusion (14). Lung carcinoma was found to be a cause of malignant pleural effusion in 43% and breast carcinoma in 25% cases in a study.(15). When patients with lung cancer are first evaluated, approximately 15% have a pleural effusion (16). During the course of this disease, however, at least 50% of patients with disseminated lung cancer develop a pleural effusion. Pleural effusions may occur with all the cell types of lung carcinoma, but appear to be most frequent with adenocarcinoma (14,17). Other malignancies such as lymphomas and malignant mesothelioma can also cause massive pleural effusion. In malignant mesothelioma pleural effusion is found in approximately 75% to 90% of patients (6,7). This effusion is frequently large, occupying 50% or more of the hemithorax and obscuring the pleural tumor. In about one third of patients, pleural plaques are evident in the opposite hemithorax (18). In the late stages of the malignant disease, the chest radiograph may show mediastinal widening, enlargement of the cardiac shadow due to infiltration of the pericardium, and destruction of the ribs or soft tissue masses (19).

Lung collapse resulting from bronchial obstruction is also an important cause of opaque hemithorax. Bronchial obstruction may be caused due to endobronchial tumours, foreign bodies aspiration, mucous plugs, or external compression from tumours/lymph nodes or infections. A left lung collapse due to an aneurysm of the descending aorta compressing onto the left main bronchus is although a rare cause, but it has been reported(20, 21). In some patients who have a history of blunt chest trauma, posttraumatic aortic aneurysms can occur and cause a similar picture (22, 23). With the symptoms of weight loss, coupled with chronic cough and haemoptysis in the elderly age group, a malignant neoplasm causing atelectasis with post obstructive pneumonia needs to be considered.

Massive tumours filling major volume of a hemithorax may compress the lung to such an extent, so that the chest

radiograph seems as completely opaque hemithorax.

Another uncommon cause of opaque hemithorax can be, the chest radiograph obtained in patients who have undergone pneumonectomy, but this condition as a cause of unilateral complete opaque hemithorax can easily be detected from the patient's history of surgery and also by the presence of post operative skin scar over patient's chest.

In many cases, the position of mediastinum in opaque hemithorax helps in narrowing down of list of differential diagnosis on chest X-ray basis. Any space occupying etiology of one side of lung shifts the mediastinum to contra lateral side. In this study, we found that 40 out of 72 patients of pleural effusion and 2 patients with lung mass had mediastinum shifted to other side, whereas in lesions with loss of healthy lung tissue may result in volume loss that shifts the mediastinum to same side. All cases of post tubercular unilateral lung destruction in our study had mediastinum pulled to ipsilateral side

In this study, out of 104 patients (69 males and 35 females), 74 were found to have pleural effusion. 19 had destroyed lung, 8 had lung consolidation/collapse and 3 had large lung mass. Other rarer causes seen as differential diagnoses for opaque hemithorax could not be found in patients in our study. Therefore, to evaluate prevalence of rare diseases as a cause of opaque hemithorax, a large study is required.

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