Radiological feature of chest x-ray in chronic obstructive pulmonary disease
correlation with clinical finding

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Abstract
Chronic obstructive pulmonary disease (COPD) is an important health problem as it is associated with significant morbidity and mortality, it is now the fourth leading cause of death globally. The long-acting bronchodilators have proved to be the most effective therapies so far available and Since COPD patients are at increased risk for co-morbidities, in these last years it has been realized that there is a strong need to look beyond the lungs in treating patients with COPD. Regarding the chest X-ray finding to exclude alternative diagnosis, evaluative of comorbidities e.g. interstitial lung disease, lung cancer with air ways obstruction, in acute exacerbation look for complicating processes e.g. pneumonia, cardiac failure, pneumothorax. This study which was carried out on 25 case sheets of patient with COPD taken from the statistic departments of AL- Hussain teaching Hospital in order to clarify the role of x-ray regarding their finding in COPD also the effect of smoking and the presence of associated diseases on radiological appearance, analyzed by excel and as a result it has been found that smokers had more incidence to having COPD than nonsmokers also patients who had associated diseases had longer duration of hospital stay and comorbidity.

Keywords: chronic obstructive pulmonary disease, emphysema, bronchitis.
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Introduction
Chronic obstructive pulmonary disease (COPD) is now the fourth leading cause of death globally, and the World Health Organization (WHO) has predicted that it will become the third most common cause of death in the world by

2030 [1]. In developed countries, current information estimates a prevalence of 8% to 10% among adults 40 years of age and older, whereas in developing countries, prevalence varies significantly among countries and is difficult to quote [2]. It is estimated that more than 210 million people have the disease worldwide [3]. Concerning a large number of subjects, COPD generates important health and social costs. However, although COPD is one of the most common chronic diseases and has a high health and social impact, it is still poorly recognized among the general public and also clinicians. Consequently, there is a major and urgent need to better understand this complex disease. More than 40 years ago, major progress has been made in the identification, pathogenesis, assessment and treatment of COPD. Nonetheless, many important questions remain unanswered. Peter J. Barnes [4] has properly and authoritatively emphasized that we still do not understand why only a minority of smokers develop airway obstruction, nor the complex interplay between different risk factors in addition to smoking and biomass smoke exposure. Moreover, we do not realize how the underlying inflammatory process is linked to pathophysiology and disease progression and the reason why inflammation and disease progression persist even after smoking cessation. COPD is a heterogeneous disease and can be classified into different “phenotypes”[5] For many years, clinicians have noted two very different subgroups of patients in COPD, those with chronic bronchitis (also called blue blotter); inflammation of bronchial tube and produce a lot of mucus that lead to cough and difficulty breathing and those with emphysema (pink puffer): its cause damage to the alveoli, air sacs. The wall of damaged air sacs become stretched and the lung actually get bigger, making it harder to move air in and out [6]. Recently, the Evaluation of COPD Longitudinally to Identify Predictive Surrogate Endpoints (ECLIPSE) study has helped improve the characterization of other subsets of patients, including the frequent exacerbate versus the infrequent exacerbate and the patient with persistent systemic inflammation versus the patient without systemic inflammation [7]. This is a provocation, but it had the merit of having emphasized the need for a more individualized therapeutic approach. The different phenotypes may respond differently to different treatments, but this is poorly understood. The interrelationships between all aspects of the disease (e.g. genetic, biological, environmental, clinical, social) will surely offer new possibilities to converge towards a new focus on COPD management that aims at personalized treatment, challenging and overcoming the classical concepts of the disease [8]. Unfortunately this approach, although extremely appealing, is still in its infancy. Since COPD patients are at increased risk for co-morbidities such as cardiovascular disease, non-psychotic mental disorders, including depressive disorders, diabetes mellitus, osteoporosis, malignant pulmonary neoplasms, skeletal muscle wasting and cachexia [9], in these last years, we have realized that there is a strong need to look beyond the lungs in treating patients with COPD [10]. Classic hemodynamic studies have shown the existence of two patterns of cardiovascular abnormalities in COPD patients with high pulmonary vascular resistance. Patients with predominant “emphysema” have mild hypoxia, mild pulmonary hypertension at rest, and low cardiac index with dyspnea (“the pink puffer”). On the other hand, patients with predominant “chronic bronchitis” have more severe hypoxia in association with hypercapnia, more severe pulmonary hypertension peripheral edema and a normal cardiac index. These distinctions have become less useful conceptually as it is increasingly recognized that many patients show features of both types. In addition later work has indicated that the classic definition may not hold. For example, cardiac output in the “pink puffer type” has been found to be normal. In response to the increased pulmonary vascular resistance (PVR) the RV gradually undergoes
hypertrophy and dilatation (cor pulmonale). This increase in end-diastolic volume ie, pre-load, to maintain a normal stroke volume accounts for the reduced right ventricular ejection fraction. The right ventricular stroke work index probably remains normal even during exercise and explained by greater pressure work and the expense of RV output. However, in severe emphysema hyperinflation, the low elastic recoil of the lungs and less negative intrathoracic pressure has the effect of compressing the two ventricles into each other. The RV is therefore unable to dilate and end-diastolic volume does not increase. This decreases RV preload and results in lower cardiac output. A decrease in intrathoracic pressure as may occur after lung volume reduction surgery, redistributes the blood volume to the thoracic compartment and increases RV and LV preload and cardiac function.

**Chest x-ray;** Chest x-ray is a simple, noninvasive imaging technique that uses electromagnetic wave to create one dimensional picture of your heart, lungs and diaphragm. While chest x-ray cannot make diagnosis of COPD, especially in early stage disease it can help support it, by and large, an abnormal chest x ray is generally only seen when the damage to the lung is extensive. In early stage, chest x-ray may in fact appear quite normal. this does not mean that there is no damage. While chest x-ray may not show COPD until it is sever. The image may show enlarge lungs irregular air pocket [bullae] or flattened diaphragm, chest x-ray may uses to determined another condition present similar to COPD Chest X-rays can help confirm a diagnosis of chronic bronchitis and rule out other lung conditions. that show over expansion of lung, small heart, increase intercostal space, depression diaphragm and prominent pulmonary vasculature

Chronic bronchitis
TABLE 1 Criteria for the radiographic diagnosis of emphysema

| Posterior          | Depression and flattening of the diaphragm with blunting of cost phrenic angles. The actual level of the diaphragm is not as significant as the contour. The body build of the subject should also be considered. In a short stocky subject, this sign might be positive even if the diaphragm was at the level of the 10th rib posteriorly.
|                   | Irregular radiolucency of the lung fields. This manifestation is the result of the irregularity in distribution of the emphysematous tissue destruction. |

| Lateral           | Abnormal retrosternal space. This is defined as a space showing increased radiolucency and measuring more than 2.5 cm from the sternum to the most anterior margin of the ascending aorta. Flattening or even concavity of diaphragmatic contours. A useful index of this change is the presence of a >90 ster diaphragmatic angle. In most patients with emphysema, this junction is more readily seen than in subjects with normal chests. |

Emphysema

Objectives

COPD is an important health problem in Iraq because it is associated with significant mortality and frequent use of emergency medical services. The objectives of this paper were to: a) clarify the relationship between use chest x-ray
and diagnosis and prognosis of COPD. B(to show the difference in the outcome of COPD patient depending on x ray finding whether single or combination abnormality ).c the effect of other disease, smoking and age on the improvement of COPD patient and so, on the duration of hospital stay.

Method
This study is related to the department of medicine in AL-Muthanna, medical College and represent as retrospective study.It was carried out on 25 patient admitted to AL-Hussain General Hospital. It involved the patients with chronic obstructive pulmonary disease who are admitted to the hospitals during the period from 1/8/2018 until 10/1/2019. The cases consist of 22 male patients and 3 female patients of different age groups. The data is collected from the files of patients and we put it in excel file and arrange it in tables in form of the -patient’s age since the extreme age groups more vulnerable for complication and so longer duration of admission -sex; generally COPD more common in male than female especially in our society under the effect of smoking {fig1} -any history of smoking because the smoking represent the major cause of COPD and stop smoking represents the first line of management of COPD{fig2} -the systemic diseases that present in addition to COPD and what are their effects on the outcome of COPD patient -the chest x ray finding in patient{fig3,fig4}. Statistical analysis was done after inputting of the data into excel.

Result
In total, of the 25 patients with COPD %88 of them are males and %12 are females of different age groups, %64 patients was active smokers or had a history of smoking and %36 nonsmokers of the total number, and there are %56 from the total number of patients had associated disease in form of: %20 with ischemic heart disease, %16 with diabetes mellitus, %8 patients with renal disease and the remaining of them had a combination of different diseases and this high percent of COPD patients with associated disease in our study may be because most of them are elderly patients. The majority of patients show hyperinflation in chest x ray in about 48% and emphysema 36% and combination with other finding when exacerbation occur as associated with inter current infection as [consolidation]occur in 20% while only 16% show normal chest x ray.
Figure 1 - male versus female (male more incidences to have COPD compared with female)

Figure 2 - smokers versus nonsmoker (smokers more incidence to have COPD than nonsmokers)
DISCUSSION
Chronic obstructive pulmonary disease divide to two type; chronic bronchitis and emphysema. Chronic bronchitis characterize by prolong cough and expectoration, cyanosis and obese that lead patient appear blue in color for this called (blue blotter) Chronic bronchitis is defined as a productive cough that lasts for three months or more per year for at least two years.[8] Most people with chronic bronchitis have chronic obstructive pulmonary disease (COPD).[9] Tobacco smoking is the most common cause, with a number of other factors such as air pollution and genetics playing a smaller role.[10] Treatments include inhaled bronchodilators and steroids.[11] Some people may benefit from long-term oxygen therapy or lung transplantation.[11]. The second type is emphysema characterize by air pocket on x-ray and barrel chest, patient thin and dyspnea but not cyanosis for this called (pink puffer). The value of chest radiography for the assessment of Emphysema has been a matter of contention since the 1960s.[12]. In radiological–pathological correlation studies, the Agreement between chest radiograph interpretation and Morphological findings ranges from excellent[11] to poor[13]. Depending upon the radiographic criteria used and the strictness applied by the investigators in matching their Interpretation to the presence or absence of structural. Therefore, the present study was undertaken in order to reappraise chest radiography as a simple means of diagnosing or excluding emphysema. In doing so, four radiographic Criteria that had been validated against lung pathology[11] were used. Since the study from which these criteria are derived was published long before the introduction of CT, it was thought reasonable to test the validity of such criteria against this newer imaging modality. Emphysema was diagnosed on chest radiographs in most Patients with CT-confirmed disease (sensitivity 90%). However, Chest radiography failed to detect trace or mild emphysema that was apparent on CT. The rate of false-positive results was very low (specificity 98%). These findings are remarkable inasmuch As three out of five independent raters had very limited experience in interpreting chest radiographs. The high inter-rater agreement may be explained as follows. First, the radiological diagnosis of emphysema is based primarily upon the evaluation of the shape of the lungs rather than on signs of vascular attenuation that are barely recognized by inexperienced clinicians or technologists. Secondly, the diagnosis of emphysema requires that at least two of the four Radiological criteria be present, and this helps to reduce inter observer Variability. Thirdly, the less experienced raters were trained to recognize chest radiographic abnormalities using an appropriate set of standards. Fourthly, all the patients were studied under stable clinical conditions. However, it is acknowledged that the inter-rater agreement reported in the present study may not be easily replicated correct recognition of emphysema on chest radiography would be equally valuable in patients who do not have or are not known to have COPD. This is quite likely to occur in clinical practice because chest radiographs are often taken for reasons other than a chronic respiratory illness. If the chest radiograph of one such patient meets the criteria for Emphysema, it is likely that the disease is present and the patient should be tested for airflow obstruction. Should the patient be a smoker, the diagnosis of emphysema would be a particularly strong indication for giving up smoking since the lungs of such patients are overtly damaged by inhaled smoke. In summary, the results of the present study indicate that chest radiography is a valuable, inexpensive means of diagnosing moderate-to-severe emphysema. However, it is less sensitive than computed tomography for the detection of mild emphysema and less accurate for the evaluation of the regional distribution of emphysema. Individuals with obstructive pulmonary disorders such as bronchitis may present with a decreased FEV1 and FEV1/FVC ratio on pulmonary function tests.[13][11][12]. Unlike other common obstructive
disorders such as asthma or emphysema, bronchitis rarely causes a high residual volume (the volume of air remaining in the lungs after a maximal exhalation effort).

**Conclusion:**

In prospective study which involved 25 cases of COPD patients most of them were males (22), either active or had a history of smoking and a large percentage of them had associated diseases in addition to COPD, the data processed by excel program and was estimated which indicated that there is significant relationship between age and had COPD as more incidence in old age, also more common in male than female. Significant relationship between smoking and COPD, and significant relationship between smoking and the duration of hospital stay, but there is significant relationship between the presence of associated disease and the prolongation of hospital stay.

**References**


