



Characteristics Feature of Chronic Obstructive Pulmonary Disease Correlation with Clinical Finding

1. Dr. Safaa Abdazahra Alwan
Althalmi

Received 2nd Apr 2023,
Accepted 19th May 2023,
Online 22th May 2023

¹ Al-Diwanyh Teaching Hospital, Al-Diwanyh health directorate, Iraq.
M.B.CH.B-A.B.M.R.

Abstract: Chronic obstructive pulmonary disease is a complex disease with heterogeneous presentation, progression, and structural abnormality that is currently graded solely on clinical and physiologic parameters. Thoracic computed tomography imaging holds promise for phenotyping in chronic obstructive pulmonary disease, but despite increasing availability, this methodology has yet to be incorporated into clinical guidelines or routine clinical practice. However, the unique clinical implications of emphysema and airways disease are becoming clearer. Emphysema has a strong association with more rapid disease progression and mortality. Airways disease has a strong relationship with symptoms and health status. It is hoped that future refinement of emphysema assessment allowing for quantitative subtyping will also increase our ability to define clinically meaningful subgroups, as will development of methodologies to assess airways disease and, in particular, small airways through inspiratory/expiratory image registration techniques. Most important, however, is the need for longitudinal data, in not only observational but also therapeutic settings, such that the impact of interventions on radiographically defined phenotypes can be assessed.

Key words: Chronic obstructive, tomography imaging.

Introduction:

Chronic obstructive pulmonary disease (COPD) is a chronic inflammatory disease affecting the airways, leading to significant morbidity and mortality throughout the world. The prevalence of Stage

II or higher COPD is 10.1% worldwide.[1] For establishing a diagnosis of COPD, according to the Global Initiative for Chronic Obstructive Lung Diseases (GOLD) guidelines, spirometry showing fixed airflow obstruction is essential. Spirometry is an inexpensive, easily reproducible and readily available test. However there are certain drawbacks of spirometry, for instance, it cannot be used in patients presenting for the 1st time in an exacerbation (being difficult to perform and less reliable). In addition, spirometry is an effort dependent procedure, so elderly patients and patients with neurological or psychiatric disorders who are unable to follow commands face difficulty in performing spirometry. Patients with oro-facial trauma or tumors are not able to perform too. Hence, in this group of patients, an alternative test to spirometry is required for establishing a diagnosis of COPD. [2]

There is the need to have a holistic evaluation of COPD patients, other than just measuring the level of obstruction as done by spirometry. High resolution computed tomography (HRCT) scan of thorax fulfills this requirement. It provides information about the extent and distribution of emphysema, the presence of chronic bronchitis, or other associated findings such as bullae, bronchiectasis and cysts. In addition, it is essential in the patients of COPD for ruling out alternative diagnoses and for presurgical assessment before lung volume reduction surgeries or bullectomy. There is increasing role of HRCT in evaluation of early emphysema in asymptomatic smokers, in patients of chronic bronchitis and in assessment of the various phenotypes of COPD. [3]

Chronic obstructive pulmonary disease (COPD) is one of the leading causes of morbidity and mortality worldwide and results in economic and social burden that is substantial. It also affects the quality of life (QoL). It is currently the fourth leading cause of death in the world.[4-6] It has been projected that COPD burden will increase in coming decades because of continued exposure to risk factors and ageing of population.[7] According to the projections, COPD will be the seventh leading cause of disability-adjusted life-years lost worldwide in 2030.[8] However, COPD is not just a pulmonary disease; it is also associated with systemic manifestations and co-morbid conditions.[9-11] Several multidimensional grading systems have therefore emerged which should enable better prediction of future morbidity and mortality risk in COPD patients than Forced Expiratory Volume 1 (FEV1) alone. Recently, updated gold guidelines advocated the use of a combined assessment approach for understanding the impact of the disease on an individual based on annual number of exacerbations, gold stage, Medical Research Council stage as well health status assessment using various questionnaires such as COPD assessment test (CAT), the clinical COPD questionnaire (CCQ) and the BODE index, etc.[7,8,9,10] We, in this study, have used CAT and CCQ scores and correlated these with BODE index in stable COPD patients for assessment of their clinical status and disease severity. [12]

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. [13]

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 anther condition present similar to COPD. [14]

Methods:

This was an observational cross-sectional study carried out in the the radiology department / Al-Diwanyh Teaching Hospital, Al-Diwanyh health directorate, during the period from January 2021 to June 2022. It was carried out on 40 patient admitted to Al-Diwanyh Teaching Hospital. It involved the patients with chronic obstructive pulmonary disease who are admitted to the hospitals. The cases consist of 26 male patients and 14 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 any history of smoking because the smoking represent the major cause of COPD and stop smoking represents the first line of management of COPD, 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.

Image interpretation: the CT findings were interpreted by two independent Radiologists. CT scan findings of COPD include: extension of bronchiectasis, severity of dilation, peribronchial thickening, tree in bud, mucoid plug, air trapping, fibrotic collapse/consolidation, bullae and emphysema. The severity of COPD was measured after calculating the scores of CT scan radiological findings. According to CT score the severity of COPD were classified in to three types: Mild severity from 1-15, Moderate severity from 16-40 and Severe type from 41- 60.

Results:

In total, of the 40 patients with COPD %79 of them are males and %21 are females of different age groups, %61 patients was active smokers or had a history of smoking and %39 nonsmokers of the total number, and there are %52 from the total number of patients had associated disease in form of: %21 with ischemic heart disease, %14 with diabetes mellitus, %13 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 46% and emphysema 34% and combination with other finding when exacerbation occur as associated with inter current infection as [consolidation] occur in 23% while only 18% show normal chest x ray.

The CT scan scoring revealed that mean total score was 41.6, 40% of patients (19 patients) had mild COPD, 29.4% of patients (12 patients) had moderate COPD and 29.1% of patients (9 patients) had severe COPD.

There was a highly significant association between increased age of patients and severe COPD ($p=0.002$). No significant differences were observed between patients with different severity of COPD regarding gender of patients ($p=0.6$). All these findings were shown in table 1.

Variable	COPD severity						P
	Mild		Moderate		Severe		
	No.	%	No.	%	No.	%	

Age							0.002*
40-49 years	19	65.0	9	26.1	1	30.0	Highly significant
50-59 years	12	23.0	17	60.2	1	26.0	
≥60 years	9	-	2	17.8	2	60.0	
Gender							0.6*
Male	14	71.0	18	81.2	3	82.0	Not significant
Female	3	23.0	2	15.8	2	18.0	

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 also known as (blue blotter).

The second type is emphysema characterize by air pocket on x- ray and barrel chest, patient thin and dyspnea but not cyanosis also known (pink puffer).

in radiological–pathological correlation studies, the agreement between chest radiograph interpretation and morphological findings ranges from excellent to poor depending upon the radiographic criteria used and the strictness applied by the investigators in matching their. [15]

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 the current study, there was a highly significant association between increased age of patients and severe COPD ($p=0.001$). This finding is consistent with results of Stone et al [16] study in UK which stated that clinicians should consider increasing age of COPD patients in assessment and management. [17-19] study in Spain reported an increase in COPD patients' age as an independent risk factor for acute exacerbation of COPD. No significant differences were observed between patients with different severity of COPD regarding gender of patients ($p=0.7$). This finding is similar to results of [20] study in Iran which found no effect of gender on severity grading of the COPD disease.

Our study revealed that long smoking duration in significantly predictor of severe COPD ($p=0.006$). Similarly, [21] found that long duration smoking history is related to severity of COPD and early cessation of smoking decreases risk of COPD severity. There was a significant association between increased daily smoking amount and severe COPD ($p=0.006$). This finding coincides with results of in Switzerland. Present study found a highly significant association between longer COPD duration and severe COPD ($p<0.001$). study in Sweden documented that patients with long COPD duration had a notably poor prognosis regarding COPD severity.

Conclusion:

Chronic obstructive pulmonary disease (COPD) is a chronic inflammatory disease affecting the airways, leading to significant morbidity and mortality throughout the world. There is a need to have a holistic evaluation of COPD patients, other than just measuring the level of obstruction as performed by spirometry. High resolution computed tomography (HRCT) scan of thorax partly fulfills this requirement.

References:

1. Global Initiative for Chronic Obstructive Lung Disease (GOLD). Global Strategy for the Diagnosis, Management and Prevention of COPD. 2014. [Last accessed on 2015 Apr 11]. Available from:
2. Chugh T, Goel N, Bhargava SK, Kumar R. Correlation of physiological and radiological characteristics in COPD. *Indian J Chest Dis Allied Sci.* 2012;54:235–42.
3. Aryal S, Diaz-Guzman E, Mannino DM. COPD and gender differences: an update. *Transl Res.* 2013;162(4):208–218.
4. Gershon AS, Wang C, Wilton AS, Raut R, To T. Trends in chronic obstructive pulmonary disease prevalence, incidence, and mortality in ontario, Canada, 1996 to 2007: a population-based study. *Arch Intern Med.* 2010;170(6):560–565.
5. Bischoff EW, Schermer TR, Bor H, Brown P, van Weel C, van den Bosch WJ. Trends in COPD prevalence and exacerbation rates in Dutch primary care. *Br J Gen Pract.* 2009;59(569):927–933.
6. Schirnhofner L, Lamprecht B, Vollmer WM, et al. COPD prevalence in salzburg, austria: results from the burden of obstructive lung disease (BOLD) study. *Chest.* 2007;131(1):29–36.
7. Akinbami LJ, Liu X. Chronic obstructive pulmonary disease among adults aged 18 and over in the United States, 1998–2009. *NCHS Data Brief.* 2011;(63):1–8.
8. WHO. WHO report on the global tobacco epidemic. 2019. Available from: https://www.who.int/tobacco/global_report/en/. Accessed September 05, 2020.
9. Sansores RH, Ramirez-Venegas A. COPD in women: susceptibility or vulnerability? *Eur Respir J.* 2016;47(1):19–22.
- 10.1183/13993003.01781-2015 10. Varkey AB. Chronic obstructive pulmonary disease in women: exploring gender differences. *Curr Opin Pulm Med.* 2004;10 (2):98–103.
10. Agusti A, Calverley PM, Celli B, et al. Characterisation of COPD heterogeneity in the ECLIPSE cohort. *Respir Res.* 2010;11:122. doi:10.1186/1465-9921-11-122
11. Dransfield MT, Washko GR, Foreman MG, Estepar RS, Reilly J, Bailey WC. Gender differences in the severity of CT emphysema in COPD. *Chest.* 2007;132(2):464–470.
12. Ni Y, Shi G, Yu Y, Hao J, Chen T, Song H. Clinical characteristics of patients with chronic obstructive pulmonary disease with comorbid bronchiectasis: a systemic review and meta-analysis. *Int J Chron Obstruct Pulmon Dis.* 2015;10:1465–1475.
13. Naberan K, Azpeitia A, Cantoni J, Miravittles M. Impairment of quality of life in women with chronic obstructive pulmonary disease. *Respir Med.* 2012;106(3):367–373.
14. Jia G, Lu M, Wu R, Chen Y, Yao W. Gender difference on the knowledge, attitude, and practice of COPD diagnosis and treatment: a national, multicenter, cross-sectional survey in China. *Int J Chron Obstruct Pulmon Dis.* 2018;13:3269–3280.
15. Myong JP, Yoon HK, Rhee CK, Kim HR, Koo JW. Risk factors for lung function impairment among the general non-smoking Korean population. *Int J Tuberc Lung Dis.* 2015;19(9):1019–1026,

16. Menezes AM, Perez-Padilla R, Jardim JR, et al. Chronic obstructive pulmonary disease in five Latin American cities (the PLATINO study): a prevalence study. *Lancet*. 2005;366(9500):1875–1881.
17. Bhome AB. COPD in India: iceberg or volcano? *J Thorac Dis*. 2012;4(3):298–309.
18. Zhong N, Wang C, Yao W, et al. Prevalence of chronic obstructive pulmonary disease in China: a large, population-based survey. *Am J Respir Crit Care Med*. 2007;176(8):753–760.
19. Korea Centers for Disease Control. Korea national health & nutrition examination survey. Available from: <https://knhanes.cdc.go.kr/knhanes/eng/index.do>. Accessed September 05, 2020.
20. Lou P, Zhu Y, Chen P, et al. Vulnerability of patients with chronic obstructive pulmonary disease according to gender in China. *Int J Chron Obstruct Pulmon Dis*. 2012;7:825–832.

