



CT SCAN PATTERNS OF PULMONARY
EMPHYSEMA IN RADIOLOGY DEPARTMENT CHEST
UNIT TIKUR ANBESSA SPECIALIZED HOSPITAL,
ADDIS ABABA UNIVERSITY, ADDIS ABABA,
ETHIOPIA FROM DECEMBER 2017 –AUGUST
2018.

INVESTIGATOR: DR. SAMRAWIT ABEBE (MD,
RADIOLOGY RESIDENT)

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Principal Investigator:

Samrawit Abebe (MD), Resident in Radiology, AAU-MF

Advisors:

Dr. Azmera Gissila, MD, SCR, SSCTI Consultant Radiologist and Cardio thoracic imaging subspecialist Assistant Professor of Diagnostic Radiology, College of Health Sciences, Addis Ababa University

Dr. Amir Alwan, MD, SCR, SSCTI Consultant Radiologist and Cardio thoracic imaging subspecialist Assistant Professor of Diagnostic Radiology, College of Health Sciences, Addis Ababa University

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Acronyms

AAU= Addis Ababa University

BLH= Black lion hospital

CLE=centrilobular emphysema

COPD=chronic obstructive pulmonary disease

LAA=Low area of attenuation

LLL= left lower lobe

LUL= left upper lobe

PLE=panloular emphysema

PSE= paraseptal emphysema

RLL= right lower lobe

RML= right middle lobe

RUL= right upper lobe

FEV=forced expiratory volume

Tb= tuberculosis

ABSTRACT

Background: Pulmonary emphysema is divided into 3 major subtypes at autopsy: centrilobular, paraseptal, and panlobular emphysema. There is also a fourth type called paracicatricial emphysema which is described in only some literatures. These subtypes can be defined by visual assessment on computed tomography (CT). This study aimed to provide a baseline on the common CT patterns of pulmonary emphysema in Ethiopia since no previous studies were done.

Materials and Methods: In this study, CT scan images of 62 patients were reviewed to determine CT patterns of emphysema in our institution from December 2018 to August 2018. The medical records and the CT reports were reviewed for demographic parameters and clinical information.

Results: The mean age of the 62 individuals studied was 58 ± 15 years. There were 42 males and 20 females. The most common CT pattern was centrilobular emphysema seen in 34(54.8%), followed by paracicatricial and paraseptal accounting for 15(24.2%) and 6(9.7%) of cases, respectively. Centrilobular emphysema was the commonest subtype associated with smoking. It involved predominantly the upper lobes. RUL or LUL were involved in 100% (34/34) cases of centrilobular emphysema.

Conclusion: centrilobular emphysema remains the most common among the CT patterns of emphysema and it is the most smoking related type of emphysema. Paracicatricial emphysema which was not mentioned in most literatures is the second most common in our set up which indicates the increased prevalence of pulmonary infections. This study highlighted the need for further study to determine the burden of smoking and pulmonary infections at community setting.

INTRODUCTION

As defined by the American Thoracic Society, emphysema is a condition of the lung characterized by permanent, abnormal enlargement of airspaces distal to the terminal bronchiole, accompanied by the destruction of their walls.

Currently, it is estimated that 2 million people in the United States suffer from emphysema. It is a significant cause of morbidity and mortality (1).

Emphysema is a major contributor to chronic obstructive pulmonary disease (COPD), which by itself is a major cause of morbidity and mortality (2). Today CT is the imaging method of choice to diagnose emphysema in living patients (3). The CT diagnosis of emphysema is morphologic and based on visual inspection for LAA (i.e., regions of parenchymal destruction).

Based on the distribution of emphysema within the secondary lobule and with respect to fissures and exterior pleural surfaces, it is possible on HRCT to separate various subtypes of emphysema (4).

1. Centrilobular emphysema (CLE) or the centriacinar form of emphysema results from dilatation or destruction of the respiratory bronchioles and is the type of emphysema most closely associated with cigarette smoking (5). CLE is also characterized by small well-defined or poorly defined areas of low attenuation surrounded by normal lung. Centrilobular pulmonary arteries or arterioles, which are often seen traversing the hypo attenuated areas, mark the center of each lobule (6).

This pattern of emphysema correlates well with pathologically demonstrated CLE (7, 8, 9) and with micro-CT measurements of the primary lesions. It is usually upper lung predominant.

Severe Emphysema, Confluent emphysema, As CLE becomes more severe, the areas of low attenuation become confluent and the centrilobular distribution becomes less apparent. In most cases, the areas of low attenuation have no visible walls; however, very thin walls may be seen—particularly when the areas of emphysema are extensive. The apparent walls in such cases probably represent atelectasis or interlobular septa adjacent to the emphysematous spaces. Confluent emphysema may be differentiated from advanced destructive emphysema by the presence of a preserved rim of normal lung attenuation intervening between areas of lung destruction, and by the absence of lobular hyper expansion, architectural distortion, or splaying or decreased caliber of vessels.

Advanced destructive emphysema is manifested as a generalized decrease of attenuation of the lung without focal hypo attenuation and represents an advanced stage of CLE. Interlobular septa are often preserved and splayed, facilitating the identification of pulmonary lobular hyper expansion. In addition, the more central pulmonary vessels are often distorted, splayed, and narrowed with decreased branching (architectural distortion). Although this pattern may be indistinguishable at CT from the pan lobular pattern described below, and the term pan lobular has been previously used to describe this entity (10), we prefer to use the term advanced destructive emphysema because it may not represent histologic panlobular emphysema (PLE).

2. Panlobular emphysema (PLE) or panacinar emphysema is not smoking related and it is manifested as a generalized decrease of attenuation of the lung parenchyma without focal lucencies (11) Interlobular septa are often preserved and splayed, facilitating identification of pulmonary lobular hyper expansion. In addition, the more central pulmonary vessels are often distorted, splayed, and narrowed with decreased branching (architectural distortion). The terms centrilobular and panlobular are derived from their gross distributions within the secondary pulmonary lobule. (12, 13)

The panlobular form of emphysema is associated with α_1 -antitrypsin deficiency and results in an even dilatation and destruction of the entire acinus.

PLE has also been reported in the absence of α_1 -antitrypsin deficiency, including in intravenous drug abuse. In cigarette smokers, mixtures of PLE and CLE can be found within the same lungs. Under these conditions, it has been suggested that PLE is less likely to be associated with small airway obstruction than CLE. However, micro-CT studies of α_1 -antitrypsin deficiency indicate that both CLE and PLE are associated with narrowing and destruction of the terminal bronchioles in end-stage COPD. At CT, advanced PLE in association with α_1 -antitrypsin deficiency often occurs in a lower lobe–predominant distribution (14,15). CLE may also be found in cigarette smokers with α_1 -antitrypsin deficiency. Earlier stages of PLE are quite difficult to identify at CT, and quantitative CT may be preferred

It has been suggested that when both are present in severe disease, either CLE or PLE predominates, and the CLE subtype is associated with more severe small airway obstruction.(17) There is a relationship between the severity of emphysema and the pack-years of cigarette smoking, but this relation is weak. Only 40% of heavy smokers develop substantial lung destruction resulting from emphysema. On the other hand, emphysema can occasionally be found in individuals with normal lung function and who have never smoked. (19, 20)

3. Paraseptal emphysema (PSE) reflects an emphysematous destruction pattern located in the periphery of the lung adjacent to the pleura or along the interlobular septa.

PSE is often not associated with significant symptoms or physiologic impairment. PSE is characterized at CT by subpleural and peribronchovascular foci of low attenuation separated by intact interlobular septa thickened by associated mild fibrosis (21).

PSE has a special predilection for peripheral subpleural lobules along the mediastinal and peripheral pleura and fissures, usually most marked in the middle and upper lungs and along the mediastinum. CT shows subpleural areas of low attenuation with a well-defined wall. Rows of PSE may mimic honeycombing, but the size of the cysts is larger than that of honeycomb cysts and architectural distortion and other signs of fibrosis are not present.

It is characterized by single or multiple bullae (i.e, sharply demarcated, air-containing spaces measuring ≥ 1 cm in diameter and possessing a smooth wall ≤ 1 mm thick). It may occasionally occur as an isolated finding. PSE is one of the many causes for spontaneous pneumothoraces. Although the pathogenesis is unclear, the relationship between PSE and a thin and tall body habitus has led to the suggestion that this subtype of emphysema is caused by the effects of gravitational pull on the lungs, with a greater negative pleural pressure at the lung apices (16, 22, and 23)

Bullae can be seen in all types of emphysema,(24) but are most commonly associated with PSE. (24) Bullae are seen as avascular low attenuation areas that are larger than 1 cm in diameter, with a thin but perceptible wall, often located in the upper lobes in both CLE and PSE, but are more evenly distributed in the lungs of patients with PLE (25) Occasionally, large bullae can cause some reduced expansion of adjacent lung parenchyma, resulting in atelectasis. The term giant bullous emphysema refers to the presence of bullae occupying one-third or more of the hemi thorax. (18)

4. Paracicatricialempysema; Irregular air-space enlargement is an additional type of emphysema that occurs in patients with pulmonary fibrosis.

It commonly is found adjacent to areas of localized parenchymal scars with latter being caused by granulomatous infections, tuberculosis, pneumonia or pulmonary infarction. On CT it is often seen as a focal emphysematous space adjacent to region of pulmonary scarring.

Emphysema will be visible in many conventional CT sections with thicknesses of 5 to 8 mm. However, it is more readily detected on high-resolution CT sections with thicknesses of 1 to 2 mm reconstructed with an edge-enhancing algorithm (26). The introduction of multidetector CT units now allows acquisition of such high-resolution CT in avolumetric manner over the entire lung, and this approach has been shown to be suitable for the assessment of emphysema [26]. The assessment of mild emphysema can further benefit from the minimum intensity projection (MIP) technique.

The accuracy of conventional C T in the detection of pulmonary emphysema is 75- 80% with increased accuracy with the use of HRCT which is 90-95%.

Statement of the problem

Ethiopia, which is located in east Africa, covers a size of 1.12 million km², with a population of 110 million and attributes of the different pulmonary diseases are not well documented due to the low accuracy of physical examination, lack of investigating modality and trained personnel in general and ,determining the current patterns of lung emphysema disease in our setting is required which can also be considered as the beginning of efforts to put forward in characterization of the lung diseases in our setting and ultimately improve its detection, treatment and possibly prevention

Literature review

In one study done in New York in January 2014 Among the 318 participants included in the analysis, mean age was 68 ± 7 years, 60% were male, and 48% had COPD that was predominantly moderate in severity (39% mild, 47% moderate, and 14% severe).

The estimated population prevalence of emphysema was 27% (95% CI, 21%-32%), with centrilobular-predominant emphysema being most common (14%; 95% CI, 10%-18%), followed by paraseptal-predominant (9%; 95% CI, 6%-12%) and panlobular-predominant emphysema (4%; 95% CI, 1%-6%). Among participants with any emphysema, multiple subtypes were present in 57%, with co-existent centrilobular and paraseptal emphysema being most frequent (27)

In other study done in America PE was found in 270 of 516 male smokers (10 of 38 female smokers had PE).

They were divided into the following 2 age groups: group A (<50 years) and group B (>50 years). Two subtypes of PE were observed: centrilobular emphysema (CLE) and paraseptal emphysema (PSE). PE was divided into the following 3 categories: I (CLE or CLE-predominant); II (CLE and PSE of equal extent); and III (PSE or PSEpredominant). Among male subjects, in age group A there were 53 subjects with some degree of PE (category I, 12 subjects [22.6%]; category II, 7 subjects [13.2%]; and category III, 34 subjects [64.2%]). Among men in age group B, there were 217 subjects with some degree of PE (category I, 109 subjects [50.2%]; category II, 23 subjects [10.6%]; and category III, 85 subjects [39.2%]).(28)

In another study done in Southampton 2016 Twenty-four mild-moderate COPD and 8 ex/current smokers with preserved lung function underwent high resolution CT and distinct emphysema subtypes were quantified using novel local histogram-based assessment of lung density

CLE was the commonest form and was associated with older age, smoking history and lower FEV1. PLE was common in younger age and PSE was the least common form and is associated with male sex, older age, worse respiratory symptoms and interstitial abnormalities

All subjects (COPD and preserved lung function) had non-emphysematous tissue, mild CLE, moderate CLE and PSE. 10 subjects had >1 % of severe CLE. Non-emphysematous tissue was the most common in 15 subjects. Mild CLE was the most common in 12 subjects and moderate CLE the most common in 4 subjects.

Non-emphysematous tissue was significantly higher in those with preserved lung function. Median percentage for mild CLE was over 30 % for subjects with and without airflow obstruction with no significant difference between the two.

The most prevalent tissue subtypes in COPD subjects were mild and moderate CLE and non-emphysematous tissue, whilst severe CLE, PSE and PLE were less frequently present.

In another study in India which was done in 2001, 945 subjects who had significant smoking history (619 men and 326 women) who had undergone CT scanning. However, only the data for male subjects were analysed due to there being too few female subjects. The male subjects were divided into the following two age groups: group A (age, ≤ 50 years) and group B (> 50 years). There were

two subtypes of PE found: centrilobular emphysema (CLE) and paraseptal emphysema (PSE). Based on these subtypes, PE was divided into the following three categories: I (CLE or CLE-predominant); II (CLE and PSE of equal extent); and III (PSE or PSE-predominant).

PE was found in 270 of 516 male smokers (10 of 38 female smokers had PE). Among male subjects, in age group A there were 53 subjects with some degree of PE (category I, 12 subjects [22.6%]; category II, 7 subjects [13.2%]; and category III, 34 subjects [64.2%]). Among men in age group B, there were 217 subjects with some degree of PE (category I, 109 subjects [50.2%]; category II, 23 subjects [10.6%]; and category III, 85 subjects [39.2%]).

In age group A, men < 50 years of age who were in category III (PSE or PSE-predominant PE) predominated (34 of 53 subjects; 64.2%). In age group B, men > 50 years of age who were in category I (CLE or CLE-predominant PE) predominated (109 of 217 subjects; 50.2%).

Objective

General objective

To determine the CT scan patterns of pulmonary emphysema in our setting

Specific objective

- To assess relationship of emphysema and cigarette smoking
- To assess relationship of emphysema patterns with age and sex
- To assess relationship of emphysemas patterns with lobar involvement
- To assess the pulmonary function of patients with emphysema
- To assess the clinical diagnosis of patients with emphysema

Methodology

Study design:

Prospective cross sectional study was conducted in the study period from December 2017 to August 2018 at TASH

Study place and period:

The study was conducted at TASH, College of Health Science, Addis Ababa University, and Addis Ababa, Ethiopia.

Source population:

All patients who had Chest CT who came to the Chest Unit of radiology department for evaluation

Study population:

All patients with CT diagnosis of emphysema in the study period

Inclusion criteria:

All patients with CT diagnosis of emphysema.

Exclusion criteria:

Patients with Chest CT diagnosis of pulmonary emphysema which has incompletely described reports and missing medical records

Sampling unit:

All patients with CT diagnosis of emphysema and with completely described CT reports and/or available medical records

Inclusion criteria:

All patients diagnosed to have chest CT scan of emphysema.

Exclusion criteria:

Chest CT scan report incompletely described

Data collection tools:

PACS (picture archiving communication system) images were reviewed to retrieve CT reports with pulmonary emphysema in the study period.

The medical records and the CT reports were reviewed for demographic parameters and clinical information.

Structured questioner was used to collect necessary information.

The questioner was structured in seven sections (see questioners)

Section one included socio-demographic variables

Section two includes clinical features.

Section three included patterns of emphysema retrieved from CT images of the patients .

Section four history of smoking

Section five affected lung lobes

Section six clinical diagnosis

Section seven pulmonary function

Data analysis

The collected data was checked for completeness, coded, entered in to SPSS version 20 statistical software packages, cleaned and analyzed by principal investigator.

Mean and standard deviation was used for numerical variable.

Frequency was used for categorical variables.

P-value was used for analysis of statistical significance and $P < 0.05$ was used as the criterion for statistical significance.

Ethical consideration:

Ethical clearance was obtained from research and publication committee of the department of radiology, faculty of medicine, AAU. Medical director of BLH was notified by official letters and no personal identification was made on the questionnaire and confidentiality of all the data was kept throughout the different stages of the study.

Clinical evaluation

Baseline clinical and demographic characteristics were obtained from the patient's medical records and CT reports. These include: Age, gender, clinical features, clinical diagnosis and pulmonary functions.

RESULT

In this study, CT images of 62 patients were reviewed to determine CT patterns of emphysema in our institution. The medical records of 38 patients were found. The median age of the cases was 58 years with standard deviation of 15, giving the 95% confidence interval of (28-88 years). Age categories were generated by changing the continuous variable age in to categorical variable. Accordingly, 5 (8.1%) were below 30 years, 64.5% of them were age between 30-65 years, and 27.4% were above 65 years old. Male proportion was 67.7% with female proportion of 32.3% resulting in male to female ratio of 2:1

Cough was the commonest clinical symptom which was observed in 39% of patients, and 25.4% of patients had both cough and shortness of breath. Chest pain and shortness of breath were observed in 8.5% and 5.1% of the patients, respectively.

Data regarding history of smoking could be retrieved only from charts of 30 patients. Among these patients, 19 of them had history of smoking whereas the remaining 11 patients did not have history of smoking. Similarly, data about pulmonary function tests of the patients were found from charts of only eight patients. Among them 2 patients had restrictive lung disease which has post tb fibrosis with paracicatricial emphysema and the remaining six patients had obstructive lung disease which has centrilobular emphysema.

Clinical diagnosis of the patients was analysed. 29% of the patients had clinical diagnosis of varieties of extra pulmonary neoplasms, 24.2% of patients had clinical diagnosis of post tb fibrosis, 14.5% had diagnosis of COPD, 11.3% of patients were diagnosed to have varieties of pulmonary infections such as tuberculosis, pneumonia, lung abscess, and aspergilloma, and lung cancer was clinically diagnosed among 6.5% of the patients.

Regarding the morphologic patterns of emphysema based on the results of CT scan, centrilobular emphysema was the commonest morphologic subtype, observed among 54.8% of patients, paracicatral emphysema was observed among 24.2% of patients, paraseptal emphysema was detected among 9.7% of patients, and no patient had CT finding of panlobular emphysema subtype. Combinations of two or more morphologic subtypes was observed among 8(12.9%) of patients. The commonest observed combination was the combination of paraseptal and paracicatral subtypes, which was observed in four patients.

RUL lobe was the commonest involved lobe in 82.3%, followed by LUL which was involved in 72.6% of patients. RML and LLL were involved in 30.6% of patients each, and RLL was involved in 19.4% of patients. Both RUL and LUL were involved in 64.5% of the cases, and at least one of them was involved in 90% of the cases. Classification based on the number of involved lobe, 25.8% of patients had involvement of singlelobe, 40.3% of patients had involvement of two lung lobes, and 33.9% of patients had involvement of three and more lung lobes.

Table1, frequency distribution of sociodemographic and clinical variables of patients with CT diagnosis of pulmonary emphysema in Tikur Anbesa Hospital, Addis Abeba , Ethiopia, from December 2017-July 2018

VARIABLE		FREQUENCY	PERCENT, %
Age	<30	5	8.1
	30-65	40	64.5
	>65	17	27.4
Sex	M	42	67.7
	F	20	32.3
Symptoms	SOB & cough	15	25.4
	Cough	23	39
	SOB	3	5.1
	Chest pain	5	8.5
	Other	13	22
Smoking	Yes	19	30.6
	No	11	17.7
	Unknown	32	51.6
Lung function test	Restrictive	2	3.2
	Obstructive	6	9.7
	Unknown	54	87.1
Clinical diagnosis	Post-tb fibrosis	15	24.2
	COPD	9	14.5
	Lung ca	4	6.5
	Extra-pulmonary ca	18	29
	Lung infections	7	11.3
	Other lung disorders	9	14.5

Relative proportions of emphysema sub-types

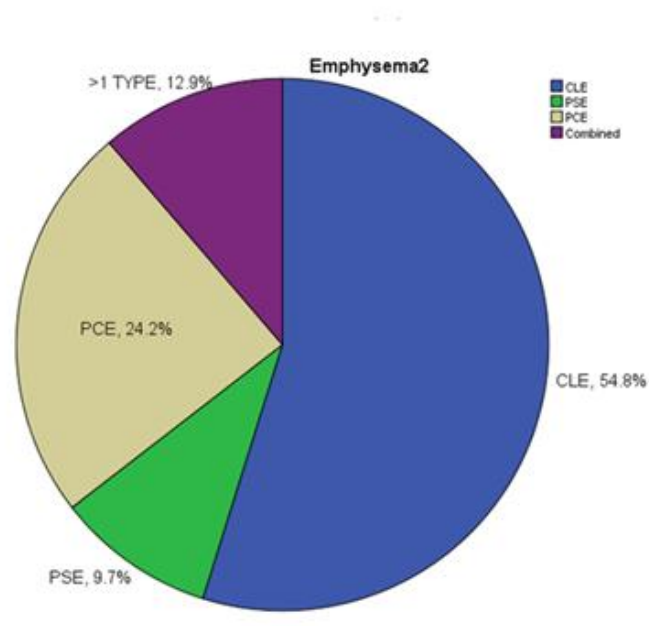


Figure 1. Frequency distribution of the distribution among the lobes and number of lobes involved among patients with CT diagnosis of emphysema in Tikur Anbessa Hospital, Addis Abeba, Ethiopia from December 2017 to July 2018

Relative proportions of involved lobes

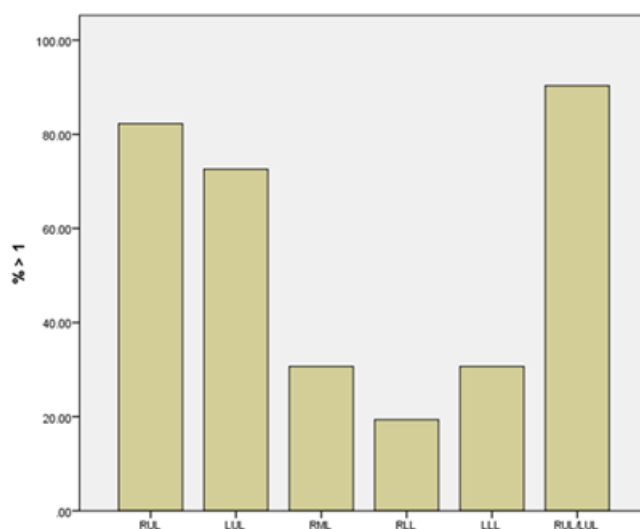


Figure 2 ; Frequency distribution of the frequency of distribution among the lobes among patients with CT diagnosis of emphysema in Tikur Anbessa Hospital ,Addis Abeba ,Ethiopia from December 2017 to July 2018

Different study variables were analysed to assess their association with morphologic subtypes of emphysema on CT scan. Accordingly, the variables which were shown to have statistically significant association with emphysema subtypes were age, distribution pattern among lobes, number of involved lobes, and clinical diagnosis. The remaining variables such as; gender, clinical features, smoking history, and pulmonary function test, had no statistically significant association with morphologic subtypes of emphysema in this study.

Age of the patient had statistically significant association with emphysema subtype. Among patients with CLE, no patient was below 30 years. There were five patients in this study who were below 30 years old, and all of them had PSE or PCE. In contrary, among elderly (>65 years) CLE was the predominant subtype in this age group. It was the subtypes observed in 70.6% of patients in this age group. The p-value for this association was 0.021, but risk ratio could not be calculated due to low frequency of observed counts among the groups.

The distribution of the emphysema with in the lung lobes had statistically significant association with emphysema subtype. All patients who had CLE had involvement of either of the right or the left upper lobe, but upper lobes were not involved in 21% of patients with PSE/PCE. P-value – 0.005, OR – 2.5, and 95% CI (1.8 – 3.5)

Generally, 74 % (46/62) patients had involvement of more than one lobe, and the remaining 26 % (16/62) involved single lobe. CLE was the subtype with the highest frequency of multiple lobe involvement. 91.2 % (31/34) of CLE involved more than one lobe. In contrary, single lobe involvement was more likely in the other subtypes. The proportion of single lobe involvement was

81% among these subtypes. This association was statistically significant with p-value of 0.001, OR – 8.9, and 95% CI (2.1 – 36.2)

Clinical diagnosis of the patient was associated with likely hood of emphysema subtype on CT scan. Among patients with clinical diagnosis of COPD, CLE was a much more likely subtype to be encountered, whereas CLE is less likely among patients with clinical diagnosis of post tb fibrosis. 88.9% of patients with clinical diagnosis of COPD had CLE, whereas off patients with clinical diagnosis of post tb fibrosis the proportion of CLE was only 13.3%. Majority of patients (73.3%) with clinical diagnosis of post tb fibrosis had PCE. The p-value for this association was 0.005; risk ratio was not calculated due to low frequency of observed counts among the groups.

The other finding was the most frequent clinical diagnosis was the extraulmonary neoplasms in 29% of cases which indicates that the CT diagnosis of pulmonary emphysema was incidental in most of the cases. This was because of the source population which was all patients who had Chest CTwho came to the Chest Unit of radiology department for evaluation

DISCUSSION

The median age of the patients in this study was 58 years, with SD of 15. This is lower than the reported median age of 68 years in other studies. One reason for this lower median age in this study may be due to low life expectancy in the general population in our country. Studies which reported a higher median age involved typical COPD patients most of them with smoke related lung diseases. This is not the case in our study where the causes of emphysema may be due to different etiologies.

Gender distribution of the patients in this study showed male were 42(67.7%) and female were 20(32.3%) with a male to female ratio of 2:1. This proportion is almost comparable with male ratio of 60% and female ratio of 40% described in other studies.

Centrilobular emphysema is the commonest morphologic subtype among pulmonary emphysema. It is the commonest subtype associated with smoking. It involves predominantly the upper lobes. Our study showed similar result regarding centrilobular emphysema. It was the commonest type observed in this study with relative proportion of 54.8% (34/62.) RUL or LUL were involved in 100% (34/34) cases of centrilobular emphysema, strengthening the fact of upper lobe predominance mentioned in other literatures. The association was statistically significant with p-value of <0.01. Among the 19 patients who had history of smoking, majority of them had centrilobular emphysema, 80 % (15/19), the test statistics failed to show significant association (p=0.16) likely because of inadequate representation of smokers due to missing data.

Since the proportion of centrilobular emphysema among smokers is much higher (80%) and there are a lot of evidences regarding the subject matter, we will not reject this association for the reason of lack of statistical significance.

Data on prevalence of the other morphologic subtypes indicate that, the second most common type is paraseptal emphysema followed by panlobular emphysema. In contrast, paracicatricial emphysema was the second most common type in our study after centrilobular emphysema. It was observed in 24.2% (15/62) patients.

Paracicatricial emphysema is defined as presence of emphysematous space adjacent to an area of scarring which might have been caused by different diseases such as silicosis, granulomatous infections, tuberculosis, pneumonia, and pulmonary infections, among others. Much of the above data are derived from western studies where smoking related lung diseases are more common than in our setup. Since we are living in the part of the world where prevalence of infectious diseases is high, post infectious complications like post tb fibrosis, and like this case paracicatricial emphysema may be significant contributors of disease burden. Therefore the high proportion of paracicatricial emphysema in our study is reasonable. In addition, the lower median age observed in this study may be due to this higher prevalence of non-smoke related emphysema.

Among patients with paracicatricial emphysema 14%(3/21) were age below 30 years, and 19%(4/21) were age above 65 years; in contrast, no patient with centrilobular emphysema had age below 30 years and the proportion of patients age above 65 years was 32%(12/37). In addition most patients with PCE (73.3%) had clinical diagnosis of post tb fibrosis, further emphasizing the likely hood of non-COPD, non-smoke related emphysematous pulmonary pathologies in this study area.

CONCLUSION

Centrilobular emphysema is the commonest morphologic subtype among pulmonary emphysema. It is the commonest subtype associated with smoking. It involves predominantly the upper lobes. Our study showed similar result regarding centrilobular emphysema

The second commonest emphysema type was paracicatricial emphysema. Since we are living in the part of the world where prevalence of infectious diseases is high, post infectious complications like post tb fibrosis, and like this case paracicatricial emphysema may be significant contributors of disease burden

Limitations of the study

Short study period and small sample size

We were not able to get complete records of some patients.

Other diagnostic tools such as pulmonary function test was available for only few patients

Recommendations

Further studies with longer duration and higher sample size are recommended which may contribute to the stastical significance of the variables which were statically insignificant in our studies

Patients' medical records should be kept well with full clinical information

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Questionnaires

1. Socio demographic data
 - 1.1 Age:
 - 1.2 Sex:
 1. Male
 2. Female
2. Clinical feature:
 1. SOB
 2. Cough
 3. Chest pain
 4. Others
3. CT diagnosis of lung emphysema :
 - 3.1 Centrilobular emphysema
 - 3.2 Pan lobular emphysema
 - 3.3 *Paraseptal emphysema*
 - 3.4 *paracicatricial*

4. History of smoking

- 4.1 yes
- 4.2 No

5. Involved lobes

5.1LUL

5.2LLL

5.3RUL

5.4RML

5.5RLL

6. Clinical diagnosis

7. Pulmonary function

7.1. Restrictive

7.2 Obstructive