



## **Frequency of Incidental Ageing-Related Lung Findings in an Elderly Population: A Saudi Teleradiology CT Study**

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### **Authors' contributions**

*This work was carried out in collaboration between both authors. Both authors contributed to study design, statistical analysis, protocol formation and manuscript writing. Author AMA performed the methodological image analysis. Both authors read and approved the final manuscript.*

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### **ABSTRACT**

**Objectives:** To assess the frequency of ageing-related lung changes seen on computed tomography (CT) chest examinations performed on teleradiology cohort of elderly patients.

**Materials and Methods:** An experienced radiologist retrospectively assessed at a 3-month worth of teleradiology data of CT chest, abdomen and pelvis performed for detection or staging of malignancy in asymptomatic patients 60 years old and older, residing in Saudi Arabia. Patients with known smoking history or obscuring abnormalities were excluded. Lung windows were analyzed to detect bronchial wall thickening, mosaic attenuation, linear scars, reticulations and pneumatoceles. Bronchial thickening and mosaic attenuation were stratified by severity, while the scars and pneumatoceles were stratified by number.

**Results:** A total of 26 cases were collected out of 137 patients, with a mean age of 67 years old (61% males). Bronchial wall thickening was detected and 56%, with 35% being of moderate

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degree. Mosaic attenuation was detected in 26%, with 70% being of mild degree. Linear scarring was seen and 61%, in the absence of reticulations. Pneumatocoeles were detected in 26%, with 22% being more than 2 in numbers.

**Conclusion:** In a select teleradiology cohort of asymptomatic CT chest imaging in elderly patients, bronchial wall thickening, mosaic attenuation, linear scarring pneumatocoeles are frequently encountered. Such findings should not lead to clinical or imaging misinterpretations.

*Keywords: Computed tomography; senile lungs; bronchial wall thickening; mosaic attenuation; pneumatocoeles.*

## ABBREVIATION

CT : *Computed Tomography*

## 1. INTRODUCTION

Several ageing-related morphological lung changes can be detected by computed tomography (CT), many of which are incidentally seen in asymptomatic populations [1-5]. Such findings include bronchial wall thickening, bronchial dilatation, mosaic attenuation from air trapping, pneumatocoeles, linear opacities and reticulations [1,2,4,6,7].

Given the increased CT utilization in assessing various thoracic and extrathoracic pathologies, the possibility of encountering incidental ageing-related pulmonary findings is high, which should not be confused with other relevant abnormalities. Elderly patients undergoing chest, abdomen and pelvis CT for detecting or staging neoplastic conditions are frequent. Thus, we elected to examine such a selective population for the frequency of encountering incidental ageing-related lung findings on CT.

## 2. MATERIALS AND METHODS

### 2.1 Subjects

A teleradiology archive of 137 chest, abdomen and pelvis CT examinations performed for detecting or staging malignancy were filtered from October 2020 until January 2021. All patients are national or residents of Saudi Arabia. Patients with known smoking history or reactive airway disease were excluded. Additionally, patients with substantial pulmonary emphysema, diffuse fibrosis, pulmonary edema, extensive metastasis, or other obscuring abnormalities were excluded as well. None of the selected cases had known history of exposure to occupational or environmental hazards.

### 2.2 Image Analysis

CT examinations were obtained according to standardized protocols. Axial images of the chest CT were evaluated in lung window (width of 1500 and level of -500) on the radiology platform of Paxera Ultima 360 (Paxera Health Co., USA) by a single experienced radiologist.

Findings were defined according to modified terms issued by the Fleischner Society [8]. Bronchial wall thickening was defined as thickening of the small airway walls beyond 1 mm and was divided on subjective bases into mild, moderate or severe. Mosaic attenuation was defined as subjectively assessed mild, moderate or severe heterogeneous or geographic bilateral diffuse lung ground-glass attenuation. Linear scars were defined as opacities radial in orientation or parallel to the pleura; divided into two groups: Patients with two or fewer scars versus those with more than two scars. Reticulations were defined as a meshwork of irregular septal thickening associated with any degree of focal distortion. Pneumatocoeles were defined as uniform thin-walled air density cysts without surrounding lung changes or internal fluid levels are soft tissue density.

### 2.3 Statistical Analysis

The data collection was documented on an Excel sheet, and statistical analyses were performed on SSPS software (version 20). Continuous variables were addressed in numbers and range, while categorical variables were addressed in numbers and frequencies.

## 3. RESULTS

After applying age-related exclusion criteria, a study population of 26 patients was collected, constituted by 14 (61%) males and 9 (39%) females. The mean age was 67 years old, with a range of 60-79 years. Bronchial wall thickening was detected in 13 (56%) of cases, appearing

mild in 8 (35%) cases and moderate and 5 (22%) cases [Fig. 1]. Mosaic attenuation was seen in 6 (26%) of patients, appearing mild in 4 (70%) of cases and moderate in 2 (9%) of patients [Fig. 2]. Linear scarring was detected in 14 (61%) of patients, with two or fewer scars seen in 6 (26%) of cases and more than two scars detected in 8 (35%) of cases [Fig. 3]. No reticulations were seen in any of the examined patients. Pneumatocoeles were detected in 6 (26%) of patients, with two or fewer pneumatocoeles detected in 5 (22%) of cases and more than two pneumatocoeles detected in 1 (4%) of cases [Fig. 4].

#### 4. DISCUSSION

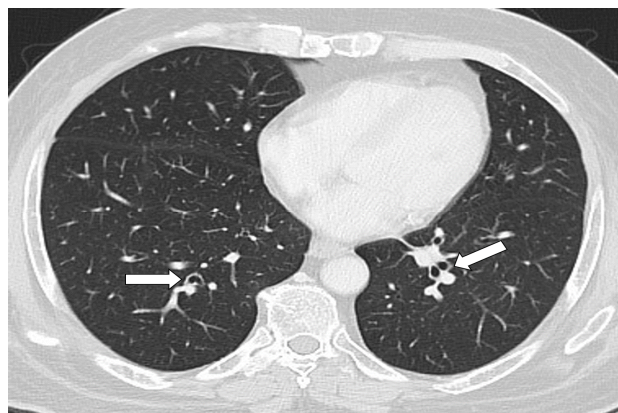
Moderate medical practice has shifted to depend heavily on the results of diagnostic imaging examinations. Thus, the number of imaged patients from various age groups has increased over the years. Such practice has enhanced the detectability of relevant abnormalities across multiple body parts. However, the rate of detecting incidental and non-clinically significant findings has also increased [9,10]. We aimed to shed some light on a selective elderly population examined in a Saudi teleradiology practice to address such findings' frequency.

Mild and moderate degrees of the bronchial wall thickening was detected in 57% of cases. Importantly, no severe bronchial wall thickening was noted. In symptomatic patients, thickening of the walls of the small airways is associated with various reactive and inflammatory conditions [11,12]. On the other hand, such finding is commonly seen in elderly asymptomatic cases,

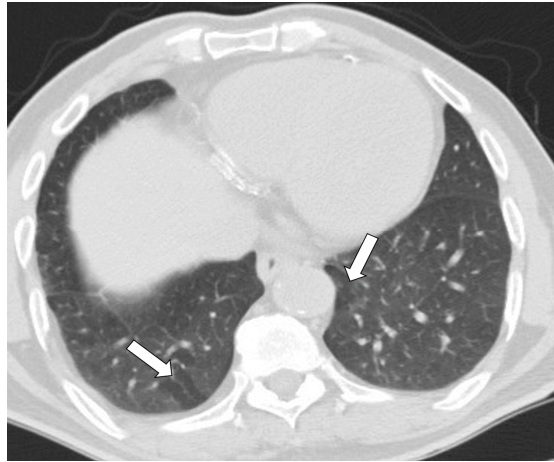
typically with the thickening is of mild or moderate degree [1,3]. Mosaic attenuation due to air trapping has a known association with small airway disease, including bronchial wall thickening [4,11]. With that in mind, it is not surprising that mild and moderate mosaic attenuation degrees have been seen in 26% of cases in the study.

Single or multiple pneumatocoeles were detected in about one-third of the study population. Thin-walled cysts may be seen in the context of various cystic lung diseases, such as lymphangioleiomyomatosis and smoking-related pulmonary Langerhans cell histiocytosis [13]. However, more frequently, such cysts are seen incidentally in a few CT imaging numbers of lungs along the various age spectrum [1,13]. The reason for such appearance is presumed to be due to remote insults affecting the lung parenchyma or airways [1,2,3,13].

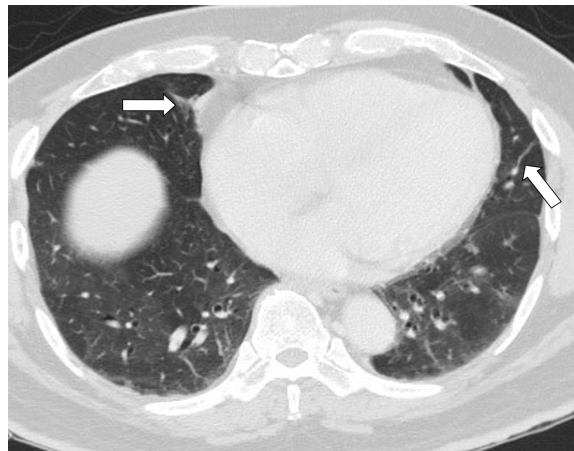
Note should be made of the small number and limited age-range of our study population, but our results are in concordance with the published data [1,2,3,6,9]. Furthermore, the study population concentrates on nationals or residence of Saudi Arabia. Although the latter fact could implicate that such results may be limited to a specific population, it also highlights a population not analyzed for such findings in prior studies. Another limitation may be a lack of correlation with pulmonary function testing, since bronchial wall thickening and mosaic attenuation may correlate with obstructive pulmonary patterns [11]. However, such testing is not usually obtained unless the patient is symptomatic.



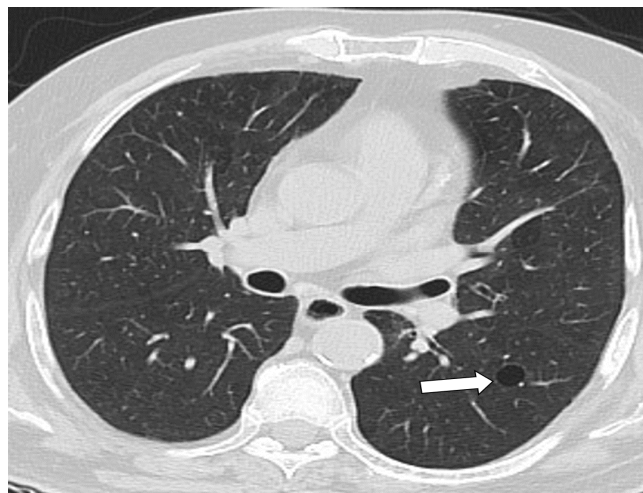
**Fig. 1. Moderate bronchial wall thickening (arrows) in a 66-year-old male patient with ureteric cancer**



**Fig. 2. Moderate mosaic attenuation (arrow) in a 77-year-old male patient with colon cancer**



**Fig. 3. Linear scars (arrows) in a 65-year-old male patient with prostate cancer**



**Fig. 4. Pneumatocoeles (arrow) in a 66-year-old male patient with esophageal cancer**

## 5. CONCLUSION

To our knowledge, this is the first report on a local asymptomatic population with CT chest imaging in a local teleradiology practice to address previously described findings known to be encountered in the senile lungs. In conclusion, our study confirms that bronchial wall thickening, mosaic attenuation, linear scars and pneumatoceles are not uncommon in such population. Awareness of these imaging appearances is essential to avoid misinterpretations that may sway management decisions or result in erroneous prognostic predictions.

## CONSENT

It is not applicable.

## ETHICAL APPROVAL

The study was approved by the Diagnostics Elite Teleradiology Co. Ethical Committee Board.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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