Brass Knuckle Sign: A Collective Appearance of Peribronchial Cuffing

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DECLARATION OF PATIENT CONSENT
The author certifies that they have obtained all appropriate patient consent forms. In the form, the patient has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published, and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

FINANCIAL SUPPORT AND SPONSORSHIP
Nil.

HUMAN AND ANIMAL RIGHTS
No ethical approval was required as it did not involve the collection or analysis of data involving human or animal subjects.

CONFLICTS OF INTEREST
There are no conflicts of interest.

ABSTRACT

Background: Peribronchial cuffing is a common finding on chest radiography, referring to an increased density of the bronchial walls. This finding is detected when pathologies targeting the bronchial wall cause increased thickness or affect the adjacent vascular bundle. Etiologies often vary from infectious to noninfectious. Different appearances of peribronchial cuffing have been reported, such as donut sign and tram track. Although sometimes its subtlety could hinder its detection and cause further delays in management. This report highlights a new and distinctive radiological appearance of peribronchial cuffing and therefore allows for early recognition. Its visual value, when put into the proper clinical context, allows for earlier narrowing of differential diagnosis and prompt management.

Case presentation: A case of a 58-year-old male, medically and surgically free, who is an ex-smoker. He presented with acute exacerbation of his chronic productive cough, chest tightness, and exertional dyspnea. He was initially suspected to have cardiogenic pulmonary edema, with initial plain chest radiography showing subtle appearances of peribronchial cuffing and airspace opacities. However, after reconsideration of the clinical context supported by physical examination, laboratory findings, and later high-resolution chest CT. It was revealed that he has a significant underlying chronic inflammatory airway disease with infectious exacerbation. The patient was treated with a focus on optimizing airway management and ultimately improved. Revisiting his initial chest radiography, a unique variant of peribronchial cuffing was discovered.

Conclusion: The brass knuckle sign is a new variant of peribronchial cuffing describing an easily distinctive radiological collection of adjacent of thickened airways.

CASE REPORT

CASE REPORT

Case presentation

A case of a 58-year-old male, medically and surgically free, an ex-smoker who stopped 8 years ago with a smoking history of 20 pack years. He reported symptoms of worsening wet cough, chest tightness, and shortness of breath in the last 5 days. He had a chronic history of intermittent productive cough and minimal exertional dyspnea. No reported hemoptysis, fever, or unintentional loss of weight. He denies orthopnea and paroxysmal nocturnal dyspnea. His past medical and surgical history were unremarkable apart from cholecystectomy 10 years back. He works as a driver with a poor socioeconomic background. No relevant family history of lung or cardiovascular diseases.

On physical examination, the patient appeared ill. He was hypoxic and tachypneic with the use of accessory respiratory muscles. No pallor, cyanosis, or lower limb edema was noted. On the chest exam, bilateral posterior polyphonic expiratory wheezes and coarse expiratory crackles were heard.

His CBC showed a mild increase in total leukocytic count. Renal and liver profile were normal. Elevations in his serum C-reactive protein (37 mg/L, reference range 0-5.0 mg/L), procalcitonin (0.3 µg/L, reference range 0- 0.05 µg/L), erythrocyte sedimentation rate (67 mm/hr, reference range 0-20 mm/hr) were notable. Troponin was within normal reference and BNP was borderline high. ABG: showed acute respiratory acidosis. ECG: sinus and regular with no ischemic changes. Initial ER portable CXR showed right middle heterogenous opacity, bilateral reticulonodular opacities and diffuse peribronchial cuffing (Figure 1).

The Patient was admitted initially under ICU care. He had supportive supplemental oxygenation and noninvasive ventilation. He received a range of bronchodilators, including salbutamol, ipratropium, and budesonide. Intravenous antibiotics, ceftriaxone and azithromycin, were also administered. Furosemide, a loop diuretic, was initially given in the emergency department. The patient was evaluated and cleared from cardiology side. After two days, non-enhanced CT chest was done showing bilateral diffuse bronchial wall dilatation, bronchiectatic changes, centrilobular nodules, and bilateral mainly lower air space opacities (Figure 2, 3, 4, 5).

After three days, the patient improved. However, he insisted on discharge to continue his care at his home country.

DISCUSSION

Peribronchial cuffing is a radiological sign indicating increased density around the walls of bronchi [1]. It results from pathologies causing either increased bronchial wall thickness e.g., bronchiolitis [5] and asthma [5], or excess fluid accumulation from surrounding lymphatics [1], Pulmonary edema [2], lymphangitis carcinomatosis [6]. Peribronchial cuffing can be readily recognized on different image modalities. It has been described from different views as donut sign [1] and tram tracks [4]. In our patient, his airways were diffusely affected by his underlying chronic inflammatory airway disease. The appearance of multiple adjacent thickened airways, especially those close to the central airways, gave a resemblance to a brass knuckle, a melee weapon, hence the name of this sign (figure 6, 7).

CONCLUSION

Peribronchial cuffing is caused by different underlying pathologies, ranging from defects in the airway walls to the affection of the surrounding vasculature. Exploring different radiological appearances of such a sign could be helpful in prompt management of these patients. The described brass knuckle sign is a newly reported and unique variant that signifies another pathological appearance of airway diseases. Radiologists and physicians are encouraged to learn of such findings.

TEACHING POINTS

Acquiring the skill of recognizing distinctive radiological signs by concerned medical trainees and the healthcare professionals is a necessary tool that will help in easily reaching appropriate diagnosis and management. A collective appearance of adjacent bronchial walls thickening, brass knuckle sign, is an addition to these signs and when put into proper clinical context will allow health providers to provide the optimal management.

QUESTIONS

Question 1: Which of the following pairings of pulmonary disease & their pathology is TRUE?

A. Chronic bronchitis – chronic inflammation with hyperplasia and hypertrophy of submucosal glands.

B. Emphysema - permanent dilation of airspaces with destruction of alveolar walls.

C. Bronchiectasis- permanent dilation of bronchi and bronchioles caused by the destruction of mucosal and elastic tissues.

D. Asthma – chronic airway inflammation and thickening, excessive mucus and remodeling

E. All the above

Explanation:

All above are true pairings of diseases and correspondent pathologies.

Question 2: Which of the following best describes the "Reid index"?

A. Ratio of smooth muscle to total bronchial wall.

B. Ratio of alveolar surface to capillary density.

C. Ratio of gland thickness to bronchial wall thickness.

D. Ratio of air trapping to total lung capacity.

E. Ratio between anteroposterior-transverse diameter of chest wall.

Explanation:

Answer C. Reid index > 0.4 is indicative of chronic bronchitis.

Question 3: Which of the following are CT signs of small airway disease?

A. Tree in bud appearance.

B. Centrilobular nodules.

C. Mosaic attenuation.

D. Air trapping.

E. All the above.

Explanation:

Answer E. All presenting small airway affection. Tree in bud appearance could be seen in endobronchial tuberculosis spread. Centrilobular nodules are commonly seen in hypersensitivity pneumonitis. Mild air trapping is common in normal individuals. Pulmonary vascular disease is other causative of mosaic attenuation.

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FIGURES

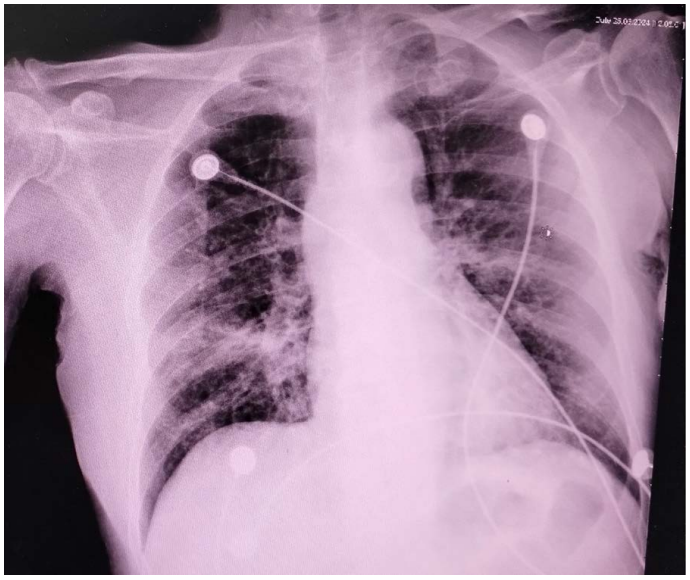

Figure 1: Admission frontal projection expiratory film (AP view) Chest Xray.

Figure 2: Non enhanced axial view high resolution CT chest.

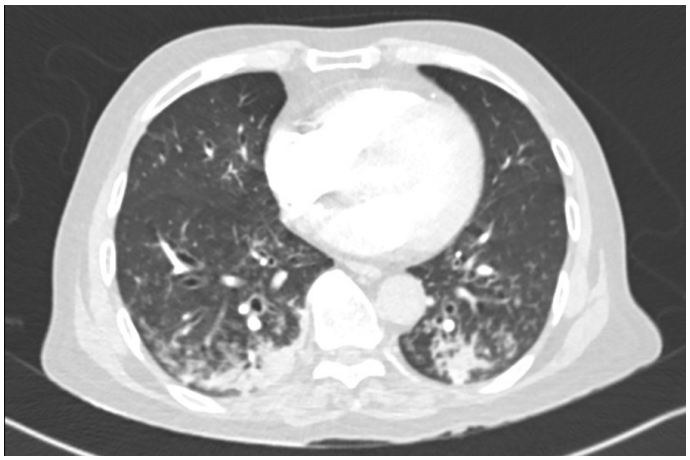

Figure 3: Non enhanced axial view high resolution CT chest.

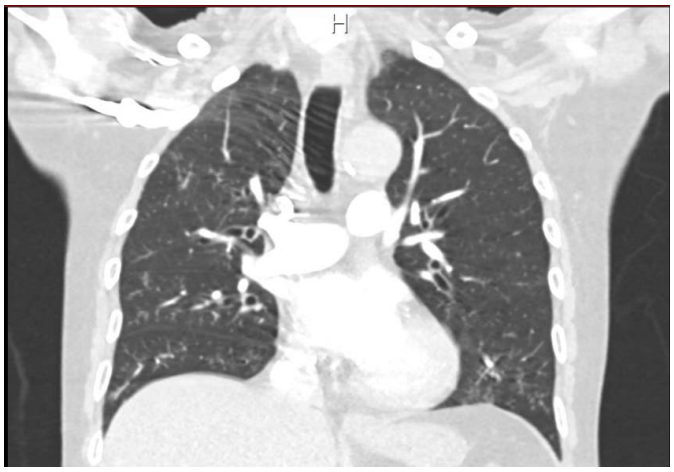

Figure 4: Non enhanced coronal view high resolution CT chest.

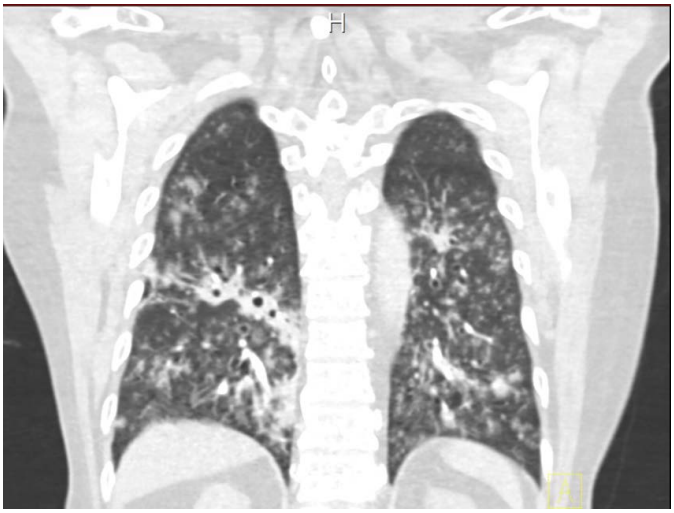

Figure 5: Non enhanced coronal view high resolution CT chest.

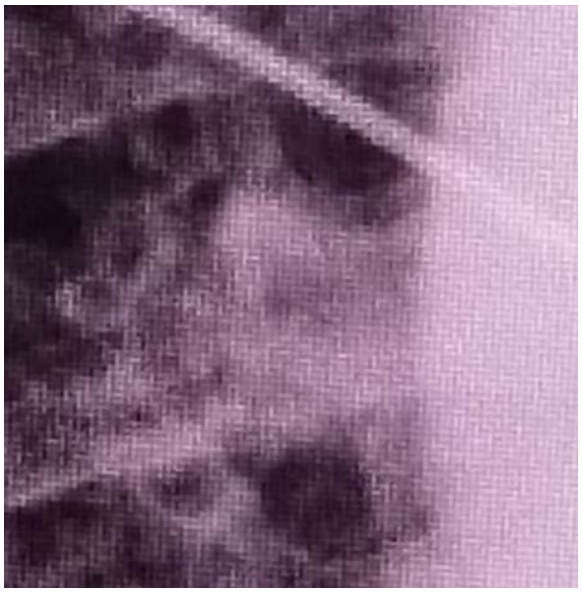

Figure 6: Close cut view of right upper central lung field (AP view) Chest Xray.

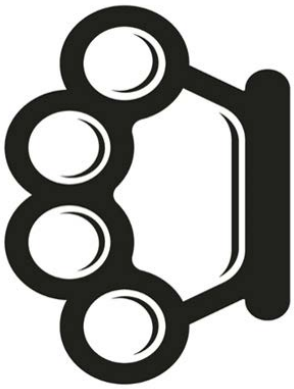

Figure 7: Brass knuckle demonstration.

KEYWORDS

brass knuckle, peribronchial cuffing, bronchial wall thickening