

Case Report

'Coin Lesion' in Chest Radiograph Presenting as Round Pneumonia with Eccentric Cavitation in HRCT Thorax: Tuberculosis or Malignancy-A Real Puzzle!

Dr. Shital Patil^{1*}, Jayashree Dahiphale², Vipul Raka², Sanika Narkar², Shubham Choudhari², Gajanan Gondhali³

¹MD (Pulmonary Medicine) FCCP (USA), Associate Professor & Head, Pulmonary Medicine, MIMSR Medical College, Latur, Maharashtra state, India

²Junior Resident, Internal Medicine, MIMSR Medical College, Latur, India

³Professor, Internal Medicine, MIMSR Medical College, Latur India

***Corresponding Author:** Dr. Shital Patil

MD (Pulmonary Medicine) FCCP (USA), Associate Professor & Head, Pulmonary Medicine, MIMSR Medical College, Latur, Maharashtra state, India

Article History

Received: 24.02.2023

Accepted: 05.04.2023

Published: 09.04.2023

Abstract: Lung malignancies have diverse radiological presentations such as coin lesions, mass lesion, hilar abnormalities, lung collapse and mass with pleural effusion. 'Coin lesion' radiologically defined as solitary, well demarcated, coin shaped lung parenchymal opacity with surrounding normal lung parenchyma. Coin lesions having propensity of calcification and cavitation. Calcification usually indicates benign nature while cavitation will indicate benign, infective and malignant lung pathology. Eccentric cavitation favours lung malignancy and central cavitation usually seen in infective pathology over malignancy. Round pneumonia is commonly described in paediatric cases and adults with comorbidities. Round pneumonia is defined as a round shaped consolidation secondary infective process. Tuberculosis causing round pneumonia and coin shaped opacities or coin lesions are not very commonly described in literature. In this case report, a 42-year male, uncontrolled diabetes mellitus presented with constitutional symptoms for one month duration with partial response to medical treatment. Chest x-ray showed coin lesion or coin shaped opacity in the left lower zone in the paracardiac area. HRCT thorax showed coin lesion with central breakdown or central lucency and round pneumonia. Contrast CT thorax showed eccentric cavitation with enhancement favouring malignancy. We have done bronchoscopy and BAL evaluation confirmed pulmonary tuberculosis. BAL cytology documented acid-fast bacilli in smear and MTB genome with rifampicin sensitivity in cartridge based nucleic acid amplification test. Treatment initiated with anti-tuberculosis (ATT) & short acting insulin according to blood sugar level. We have recorded near complete radiological resolution, bacteriological cure after six months with good compliance. High index of suspicion is must in cases with 'coin lesion' in chest radiograph with underlying comorbidity as diabetes mellitus with constitutional symptoms. HRCT thorax will help in defining characteristics of coin lesions such as cavitation and calcification. Bronchoscopy is a very crucial technique in evaluating these cases and conforming infective or malignant pathology for coin lesions.

Keywords: Coin lesion, round pneumonia, HRCT thorax, Pulmonary Tuberculosis, Bronchoscopy, Gene Xpert MTB/Rif.

INTRODUCTION

Round pneumonia has been defined as an oval or round shaped consolidation distributed in a nonsegmental pattern, found mostly in children. Owing to its radiological appearances, it stimulates bronchogenic carcinoma particularly in adults. Round pneumonia is a condition usually seen in children, with very few reports recorded in adult patients. It is a type of acute infective pneumonia with a round-shaped consolidation area radiologically [1]. It simulates

Copyright © 2023 The Author(s): This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC BY-NC 4.0) which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited.

CITATION: Shital Patil, Jayashree Dahiphale, Vipul Raka, Sanika Narkar, Shubham Choudhari, Gajanan Gondhali (2023). 'Coin Lesion' in Chest Radiograph Presenting as Round Pneumonia with Eccentric Cavitation in HRCT Thorax: Tuberculosis or Malignancy-A Real Puzzle!. *South Asian Res J Med Sci*, 5(2): 33-40.

pulmonary masses both clinically and radiologically. Round pneumonia can be difficult to distinguish from bronchogenic carcinoma particularly in adults. Owing to high prevalence of tuberculosis in India and radiological similarities, many patients with lung cancer initially get wrongly diagnosed and treated for pulmonary tuberculosis, and there appears to be an unacceptable delay during the diagnosis and treatment of lung cancer. Pulmonary tuberculosis can have diverse presentations ranging from cavitation, consolidation, tumorous lesions, lower lung field tuberculosis and endobronchial and miliary nodules [2-12]. Similarly, non-tuberculous pathologies can present with abnormalities such as consolidations, nodules, cavitations mimicking tuberculosis [2-12]. Bronchoscopy is a very crucial interventional pulmonology technique in evaluating these cases [2-12]. In present case report we have observed coin lesion as presenting feature of pulmonary tuberculosis diagnosed by bronchoscopy guided investigations.

CASE SUMMARY

42-year-old male, farmer by occupation, tobacco addict, normotensive and diabetic with history of weight loss of 3kg in one month is referred to our center by family physician for recurrent, partially responding constitutional symptoms.

Further clinical details-

1. Fever-for one-month, intermittent, low grade without chills and rigors associated with minimal body ache and fatigability. He was treated as case of enteric fever for two weeks by family physician.
2. Cough-minimal dry, intermittent, with no sputum production.
3. Loss of appetite and weight loss over period of one month.
4. Weakness and myalgia with fatigability for one month.

Clinical examination documented as-

- Thin built, anxious, normal temperature and no pallor, cyanosis, clubbing.
- Heart rate-78/min Respiratory rate: 14/bpm, BP-110/60 mmhg.
- PsO₂: 99% @ room air resting.
- Respiratory system examination revealed- bilateral breath sounds normal, no adventitious sounds heard.
- Cardiovascular, gastrointestinal & nervous system examination were normal.

We have done tropical workup with routine investigations and chest x-ray documented well defined round opacity or coin lesion in left lower zone in paracardiac legion with normal lung parenchyma in both lung fields with normal hilum (Image 1).

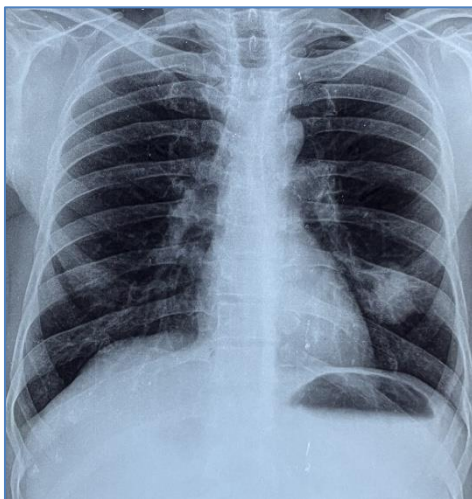


Image 1: Chest x-ray PA showing coin lesion or round opacity in left lower zone

Laboratory Examination during hospitalization documented as-

- Hemoglobin-10.0 gm% total white blood cells-6000/mm³ Polymorphs-65%, Platelet count-490000/Ul.
- CRP-35 mg/L (0-6 mg/L), random blood sugar level-380 mg% HbA1C-11.9 %.
- LDH-790 IU/L (70-470 IU/L), Uric acid-3.4 mg (3.5-7.5 mg/dL).
- Serum electrolytes: Sodium-130 meq/L (135-145 meq/L) Potassium-3.7 meq/L (3.5-5.5 meq/L) Ionic calcium-1.39 meq/L (1.09-1.36 meq/L).
- D-dimer-580 ng/ml (<500 ng/ml).
- IL-6-1.75 pg/ml (0.00-7.00 pg/ml).

- Serum creatinine-1.0 mg/dL (0.7-1.4 mg/dL).
- Liver function tests- normal.
- Thyroid functions-normal.
- Viral markers such as HIV-II and HIV-II antibody negative and Australia antigen negative.

We have done HRCT thorax with contrast for coin lesion in left lung to assess characteristics of round opacity such as cavitation and calcification [Image 2-4].

HRCT Thorax documented as-

1. Well defined, solid, round opacity in peripheral part of left lower lobe in posterior basal segment called as coin lesion. Surrounding lung parenchyma, pleura, and vasculature is normal [Image 2].
2. Round pneumonia i.e., round shaped consolidation left lower lobe [Image 2].
3. Coin lesion showing tiny central lucency may be because of necrosis or breakdown of consolidation [Image 3].
4. Coin lesion showing eccentric cavitation without fluid level and calcification in left lower lobe [Image 4].

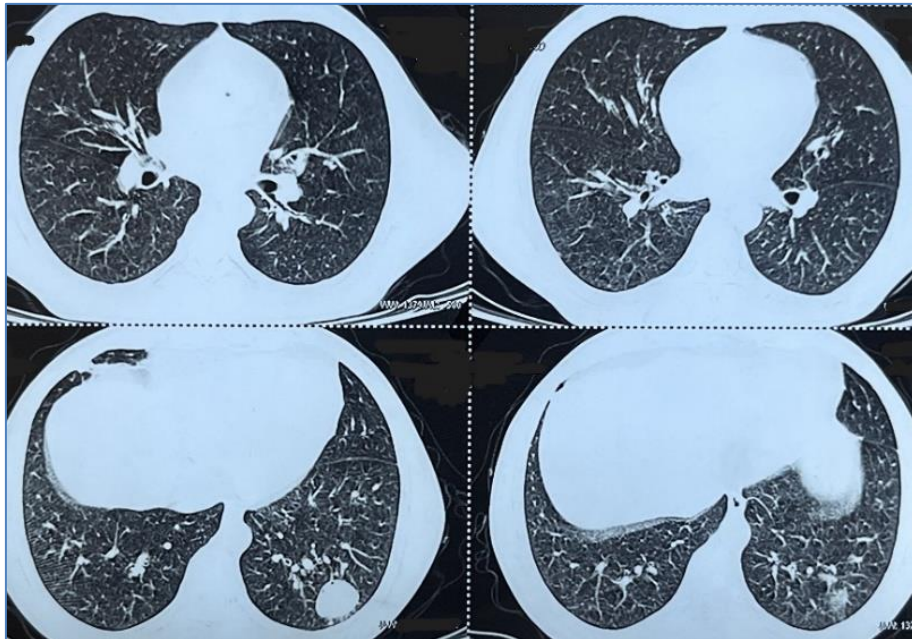


Image 2: HRCT thorax showing round consolidation in left lower lobe posterior basal segment with normal lung parenchyma

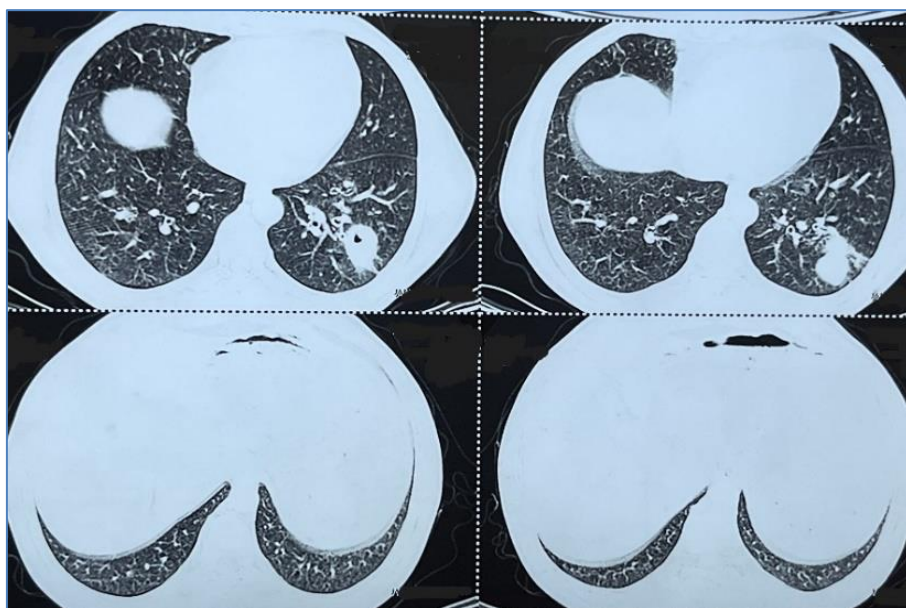


Image 3: HRCT thorax coin lesion with central lucency or cavitation

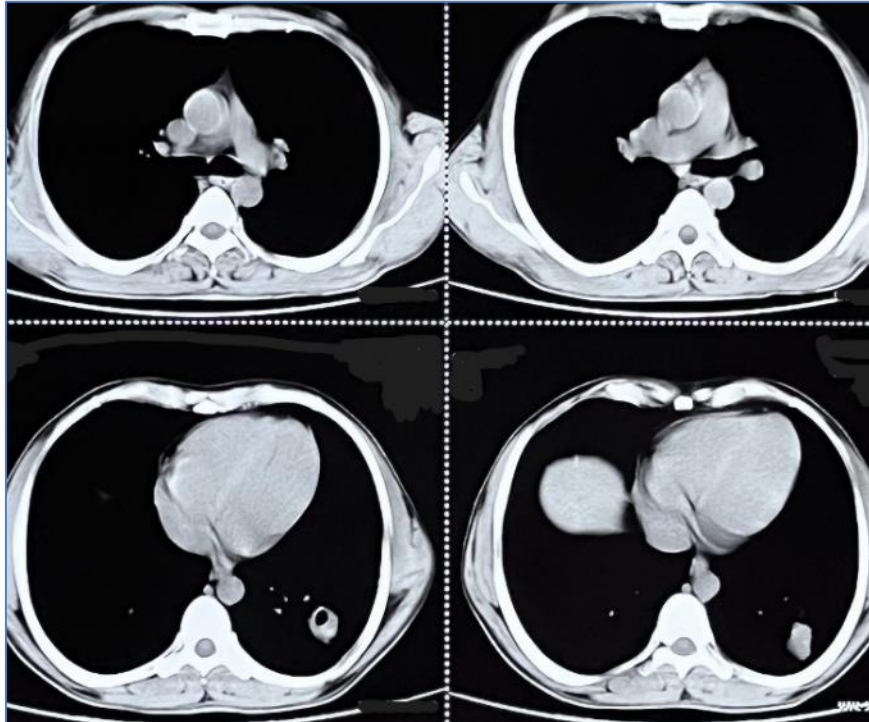


Image 4: HRCT thorax mediastinal window showing eccentric cavitation without air fluid level and calcification in round pneumonia in left lower lobe

We have performed bronchoscopy for coin lesion with eccentric cavitation or cavitating round pneumonia. Fiberoptic videobronchoscopy done with all standard precautions under topical anaesthesia. Bronchoscopy documented pale and unhealthy mucosa of left lower lobe segmental bronchial openings, purulent secretions coming out from medial and posterior basal segmental opening [Image 5].

Bronchoalveolar lavage collected in three different aliquots after instillation of 80 ml saline in left lower lobe basal segments. BAL samples were sent for cytology, gram and ZN stain, bacterial, fungal culture and Gene Xpert MTB/RF.



Image 5: Bronchoscopy image showing increased rugosity left lower lobe bronchial mucosa

BAL sampling reports were-

- Gram stain- few gram-positive cocci in pairs and chains.
- ZN stain- acid fast bacilli documented.

- Bacterial culture- no growth.
- Fungal culture- no growth.
- Gene Xpert MTB/RIF- documented mycobacterium tuberculosis (MTB) genome and negative for rifampicin resistance (rpo-b mutation).

We have started anti-tuberculosis treatment (ATT) as per the NTEP (National tuberculosis elimination program) protocol according to weight band containing four drugs isoniazid (H), rifampicin (R), ethambutol (E), and pyrazinamide (Z). She was discharged to home with advice for strict anti-TB treatment as four drugs in the first 2 months (HRZE) and three drugs in the next 4 months (HRE) as per the NTEP national guidelines for TB treatment. Microbiological examination documented negative MTB genome in sputum at 2 months of treatment. Radiological resolution of opacity has documented after five months of ATT treatment [Image 6].

We have documented weight gain and general health improvement with best compliance to anti-TB treatment and observed the importance of counselling. She was regularly monthly followed for 6 months; clinical and radiological assessment was done in every visit. We have documented clinical, microbiological and radiological ‘cure’ after six months of treatment.

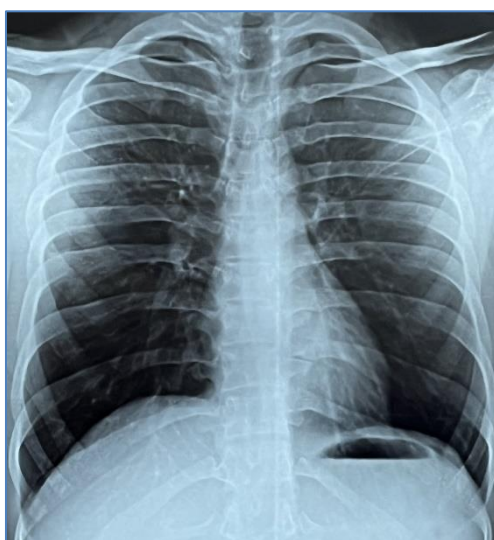


Image 6: Chest x-ray showing complete resolution of coin lesion or round pneumonia

DISCUSSION

Round pneumonia, also called spherical pneumonia, has been recognized since the 1970s as a clinical entity that usually occurs in children [13]. Young children are predisposed to round pneumonia because of their underdeveloped pores of Kohn and Lambert's channels that may cause the centrifugal spread of fluid or bacteria [14]. It simulates pulmonary masses both clinically and radiologically. Round pneumonia can be difficult to distinguish from bronchogenic carcinoma particularly in adults. Round pneumonias are roundish and although they are well circumscribed parenchymal opacities, they tend to have irregular margins. The typical location is the posterior and lower lobe [15]. Round pneumonia should be suspected in an adult patient who presents with a pulmonary mass, especially if he has respiratory infection symptoms, is a young non-smoker, and has no other findings to suggest malignancy. Streptococcus pneumoniae is the most common pathogen of spherical pneumonia in both adults and children, and other pathogens include Klebsiella pneumoniae, Haemophilus influenzae, and Mycobacterium tuberculosis [16, 17].

Round pneumonia comprises less than 1% of all “coin lesions” seen radiologically. Whenever a coin lesion is found, lung carcinoma is the most common provisional diagnosis made by both clinicians and radiologists. CT scan of the chest, followed by further diagnostic procedures like percutaneous or bronchoscopic biopsy are needed to clinch the final diagnosis and to rule out bronchogenic carcinoma [15, 18]. Round pneumonia occurs most commonly (more than 90%) in children (patients younger than 12 years). The mean age of patients with round pneumonia is 5 years. Because collateral airways develop by the age of 8 years, round pneumonia is uncommon after this age [19].

The reason for developing round pneumonia much more frequently in children than in adults relates to the development of collateral ventilation (interalveolar communications) and collateral airways. Collateral ventilation is thought to occur through alveolar pores of Kohn, interbronchiolar Martin's channels, and bronchoalveolar Lambert's channels [Figure 1]. Pores of Kohn and Lambert's channels are absent in newborns, and they develop at around 4 years

of age [20]. When they develop, they allow air drift between the parenchymal subsegments. In adults, these allow lateral dissemination of infection throughout a lobe, leading to lobar pneumonia. In children, where these pores and channels have not developed, the limited spread of infection results in round pneumonia. This is why pneumonia in young children is often not seen as lobar pneumonia, they just form localized “round” pneumonia [19].

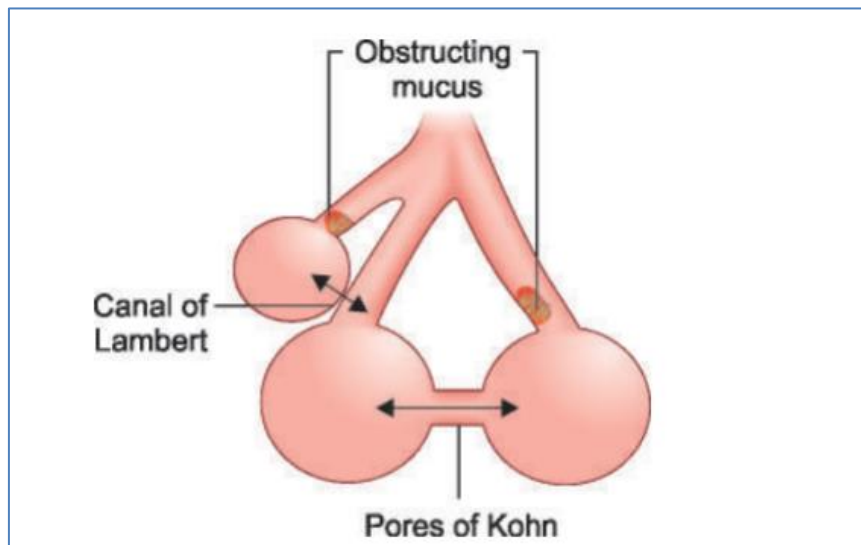


Figure 1: Alveolar collateral channels in older children and adults facilitate gas exchange around obstructing bronchus

More than 75% of round pneumonia has no proven etiology. Causes of round pneumonia can be infectious and noninfectious/ non-neoplastic [21].

1. **Round Pneumonia due to Infection:** If history suggests infective etiology, the workup should include-

- *S. pneumoniae*,
- *Haemophilus influenzae*,
- Q fever, and
- *Legionella micdadei*.

2. **Noninfectious/non-neoplastic causes of round pneumonia include:**

- Atelectasis and
- Congenital bronchopulmonary sequestration, which usually occurs at the lung bases, more commonly on the left.

The most common infective agent in round pneumonia is bacterial. *S. pneumoniae* is the leading cause of round pneumonia followed by *H. influenzae* and *Legionella*. Antón *et al.*, [22] reported Q fever, the most common cause of round pneumonia in adults in endemic area and concluded that the findings of round pneumonia were evidence for Q fever. Besides *S. pneumoniae*, *C. burnetii*, and SARS coronavirus, other organisms have been reported to cause round pneumonia are [19]:

1. *Klebsiella pneumoniae*,
2. *H. influenzae*,
3. *Mycobacterium tuberculosis*,
4. *Legionella pneumophila*,
5. *Mycoplasma pneumoniae*,
6. *Chlamydia pneumoniae*,
7. *Chlamydia psittaci*,
8. *Nocardia spp.*, and
9. *Aspergillus spp.*

Differential Diagnosis of round Pneumonia in Adults:

1. Bacterial infection,
2. Pulmonary masses,
3. Bronchogenic carcinoma,
4. Pulmonary metastases,
5. Bronchogenic cyst,

6. Pleural fibroma,
7. Fungal infection,
8. Round atelectasis,
9. Radiation pneumonitis,
10. Pulmonary pseudotumor.

CONCLUSION

In our study we have documented coin lesion in chest radiograph presenting as round pneumonia in 42 year old adult male with comorbidity s diabetes mellitus. Constitutional symptoms, comorbidity and typical HRCT findings of solitary mass with cavitation puzzled between malignancy and tuberculosis. Bronchoscopy guided BAL analysis helped in confirming pulmonary tuberculosis as cause for round pneumonia in our case. Treatment with anti-tuberculosis medicines as per weight band according NTEP program has sowed complete clinical response and radiological resolution of round pneumonia and coin lesion in chest radiograph.

Key learning points from this case report are:

1. Coin lesions in chest radiographs have been observed commonly due to malignancy in adults and infective processes in children.
2. Round pneumonia in adults is uncommon and presenting as a ‘coin lesion’ in chest imaging needs prompt evaluation to differentiate from benign, infective and malignant lung pathologies.
3. HRCT imaging is necessary in cases with coin lesions and round pneumonia as more finer details of cavitation, calcification and overall lung parenchymal and mediastinal evaluation is possible. It will help in predicting benign from malignant processes.
4. Coin lesions with cavitations and calcifications are usually due to infective or benign lung pathologies.
5. Pulmonary tuberculosis is the most common cause for coin lesion with cavitation and or calcification due to the more prevalent nature of disease. While absence of these features favors lung malignancy.
6. In our case, additional findings to coin lesion with cavitation is presence of constitutional symptoms and comorbidity which has given clinical and radiological clues to workup towards infective cause for round pneumonia.
7. Bronchoscopy is an important tool to diagnose coin lesion or round pneumonia. BAL sampling with an experienced operator has definite diagnostic yield and adequate samples should be taken to reach the final diagnosis.
8. Hence, important clinical lesson is all the cases with ‘Coin lesion’ on chest radiograph presenting as Round Pneumonia with eccentric cavitation should be analyzed thoroughly for underlying active pulmonary tuberculosis, as it indicates underlying active disease process due to *Mycobacterium tuberculosis* in presence of comorbidities such as Diabetes mellitus.
9. Although coin lesion or round pneumonia due to pulmonary tuberculosis is less commonly described in literature, it should be kept as frontline differential in presence of cavitation, comorbidity and constitutional symptoms.
10. Important quote which is a misnomer about ‘Coin lesion and Round pneumonia’ is ‘*rare things rare to happen & now rare things not rare to happen*’ because although round pneumonia is uncommon in adults, TB is not uncommon.

Conflicts of Interest: Nil.

Research Funding: Nil.

REFERENCES

1. Rose, R. W., & Ward, B. H. (1973). Spherical pneumonias in children simulating pulmonary and mediastinal masses. *Radiology*, 106, 179–182.
2. Shital, P., & Halkanche, G. (2014). Cavitory Lung Disease: Not Always due to Tuberculosis! Primary Lung Cancer with Smear Positive Pulmonary Tuberculosis- A Case Report. *American Journal of Medical Case Reports*, 2(8), 164-166.
3. Shital, P., Anil, J., Sanjay, M., & Mukund, P. (2014). Tuberculosis with Diabetes Mellitus: Clinical-Radiological Overlap and Delayed Sputum Conversion Needs Cautious Evaluation-Prospective Cohort Study in Tertiary Care Hospital, India. *J Pulm Respir Med*, 4, 175.
4. Patil, S., & Laxman, K. (2014). ‘Tennis Racket cavity’ on Chest Radiograph: Strong Predictor of Active Pulmonary Tuberculosis! – A Case Report. *American Journal of Medical Case Reports*, 2(9), 167-169.
5. Patil, S., Choudhary, C. R., Laxman, K., & Ayachit, R. (2015). Endobronchial Tuberculosis Presenting as a Post-obstructive Pneumonia, Para-hilar Mass Lesion in Chest Radiograph and ‘Tumorous’ Endobronchial Lesion during Bronchoscopy: A Case Report. *American Journal of Infectious Diseases and Microbiology*, 3(5), 147-151.

6. Patil, S., Narwade, S., & Mirza, M. (2017). Bronchial wash Gene Xpert MTB/RIF in lower lung field tuberculosis: Sensitive, superior, and rapid in comparison with conventional diagnostic techniques. *J Transl Intern Med*, 5, 174-85.
7. Patil, S., & Gondhali, G. (2018). Short course of high dose steroids used for non-pulmonary indication like anaphylaxis caused flare up of tuberculosis & presenting as acute pulmonary tuberculosis with pleural effusion: a case report. *European Journal of General Medicine*, 15(1), 37-42.
8. Shital, P., & Mazhar, M. (2018). Tuberculous Lymphadenitis of Hilar Lymph Nodes as a Cause of Right Middle Lobe Syndrome: A Case Report. *Respir Case Rep.*, 7(2), 90-96.
9. Patil, S., & Patil, R. (2018). "Fleeting pulmonary infiltrates in allergic bronchopulmonary aspergillosis" Misdiagnosed as tuberculosis. *Int J Mycobacteriol*, 7, 186-90.
10. Patil, S., & Jadhav, A. (2019). Short course of high-dose steroids for anaphylaxis caused flare up of tuberculosis: A case report. *J Transl Int Med*, 7, 39-42.
11. Patil, S., & Gondhali, G. (2021). Pulmonary Melioidosis Masquerading as Tuberculosis: A Case Report. *Electron J Gen Med*, 18(5), em310.
12. Patil, S., & Gondhali, G. (2021). COVID-19 pneumonia with pulmonary tuberculosis: Double trouble. *Int J Mycobacteriol*, 10, 206-9.
13. Rose, R. W., & Ward, B. H. (1973). Spherical pneumonias in children simulating pulmonary and mediastinal masses. *Radiology*, 106, 179-182.
14. Restrepo, R., Palani, R., Matapathi, U. M., & Wu, Y. Y. (2010). Imaging of round pneumonia and mimics in children. *Pediatric radiology*, 40, 1931-1940.
15. Wagner, A. L., Szabunio, M., Hazlett, K. S., & Wagner, S. G. (1999). Radiologic manifestations of round pneumonia in adults. *Am J Roentgenol*, 172, 549-550.
16. Zinkernagel, A. S., Schaffner, A., & Himmelman, A. (2001). Photo quiz. Round pneumonia due to *Streptococcus pneumoniae*. *Clin Infect Dis*, 32, 1188
17. Prakash, V., Verma, A. K., Bhatia, A., Singh, A., Kant, S., & Singh, A. (2018). Tubercular round pneumonia simulating a mass lesion in an adult. *The Egyptian Journal of Internal Medicine*, 30, 170-172.
18. Hershey, C., & Panaro, V. (1988). Round pneumonia in adults. *Arch Intern Med*, 148(5), 1155-1156.
19. Verma, S., & Vora, A. (2022). Community-acquired round Pneumonia in a 63-year-old Female. *J Assoc Physicians India*, 70(6), 85-88.
20. Terry, P. B., & Traystman, R. J. (2016). The clinical significance of collateral ventilation. *Ann Am Thorac Soc*, 13(12), 2251- 2257.
21. Kara, P. H., Demircan, A., Akinci, E., Bildik, F., Aygencel, G., & Ozsarac, M. (2010). Focal mass-like opacity on chest radiography: round pneumonia. *The Journal of emergency medicine*, 39(1), e89-e90.
22. Antón, E. (2004). A frequent error in etiology of round pneumonia. *Chest*, 125(4), 1592-1593.