VOLUME - 11, ISSUE - 09, SEPTEMBER - 2022 • PRINT ISSN No. 2277 - 8160 • DOI : 10.36106/gjra

Original Research Paper

Respiratory Medicine

# LUNG CAVITATION: AN UNWANTED COMPLICATION OF COVID-19 LUNG DISEASE

| | |
|---|---|
| **Dr Ravi A Dosi** | Professor & Head, Department Of Respiratory Medicine,Sri Aurobindo Medical College, Ujjain State Highway,Near Mr-10 Crossing ,Indore,453555. Madhya Pradesh INDIA. |
| **Dr Shailendra Shivhare*** | Post-Graduate Student, Department Of Respiratory Medicine, Sri Aurobindo Medical College, Ujjain State Highway, Near Mr-10 Crossing ,Indore,453555.Madhya Pradesh INDIA. *Corresponding Author |
| **Dr Ankur Agrawal** | Assistant Professor, Department Of Respiratory Medicine, Sri Aurobindo Medical College, Ujjain State Highway,Near Mr-10 Crossing ,Indore,453555.Madhya Pradesh INDIA. |
| **Dr Neha Jaiswal** | Senior Lecturer, Department of Pedodontics & Preventive Dentistry, Sri Aurobindo Dental College & Research Centre, Ujjain State Highway,Near Mr-10 Crossing ,Indore,453555.Madhya Pradesh INDIA. |
| **Dr Ravindra Patidar** | Post-graduate Student, Department Of Respiratory Medicine, Sri Aurobindo Medical College, Ujjain State Highway, Near Mr-10 Crossing, Indore,453555.Madhya Pradesh INDIA. |

**ABSTRACT**

**Aim & objective:** To assess the incidence of pulmonary cavitatory lesion in patients with COVID-19 and describe its characteristics and evolution. **Methodology:** The present descriptive observational study was conducted on 1105 RT-PCR Confirmed cases of SARS-COV-19 in Sri AUROBINDO MEDICAL COLLEGE AND PG INSTITUTE, INDORE, Madhya Pradesh january 2021 to june 2021. **Conclusion:** This study highlights that lung cavitatory lesion in patients with severe COVID-19 lung disease can occur, is associated with secondary complications of hemoptysis, pneumothorax, and confers a poor prognosis. Early cross sectional imaging should be considered if there is suspicion of cavitatory lesion on plain radiographs, and a more aggressive investigation and treatment of possible invasive fungal infection undertaken. Further studies are needed to determine whether treatment with tocilizumab, systemic glucocorticoids or a combination of both may increase the risk of developing lung cavitatory lesion in patients with COVID-19.

**KEYWORDS :**

## INTRODUCTION

The coronavirus disease 2019 (COVID-19) pandemic has caused over 6,294,969 recorded deaths worldwide thus far. Infection with the novel severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) causes COVID-19 which can lead to pneumonia and severe acute respiratory syndrome. The typical abnormalities seen on computerized tomography (CT) of the chest in patients with COVID-19 lung disease have been well described, with a comprehensive review and meta-analysis of 55 studies finding peripheral ground glass opacities in most, consolidation in 44% (95% CI 1–71%), air bronchograms in 43% (95% CI 8–80%), linear opacities in 41% (95% CI 7–65%), crazy-paving pattern in 24% (95% CI 3–92%) and interlobular septal thickening in 23% (95% CI 1–80%) of the CT scans reviewed.

Notable is the absence of cavitation. Similarly, another meta-analysis of 15 studies including 2451 patients did not report any cavitation, but commented on the development of traction bronchiectasis, consolidation, lymphadenopathy and pleural effusions at late stages of severe disease. Reports from the previous two coronavirus epidemics, SARS-CoV and Middle East Respiratory Syndrome coronavirus (MERS-CoV), indicate similar patterns of radiological abnormalities with the development of bilateral, predominantly lower lobe, subpleural distribution of ground glass opacities and consolidation in both. However, MERS-CoV had more severe inflammatory changes with reports of pleural effusions and only MERS-CoV reports noted the rare presence of pulmonary cavitation.Pulmonary radiological findings of the covid-19 have been well known and range from scattered ground-glass infiltrates in milder cases to confluent ground-glass change, dense consolidation, and crazy paving in the critically ill. However, lung cavitatory lesion has not been commonly described in these patients.

## AIM AND OBJECTIVE:

To assess the incidence of pulmonary cavitatory lesion in patients with COVID-19 and describe its characteristics and evolution.

### Design, Setting And Participants:

The present descriptive observational study was conducted on 1105 RT-PCR Confirmed cases of SARS-COV-19 in Sri AUROBINDO MEDICAL COLLEGE AND PG INSTITUTE, INDORE, Madhya Pradesh january 2021 to June 2021.

### Introduction

The outbreak of severe acute respiratory syndrome coronavirus 2 (sars-cov2) infection started in december 2019 in china and has since spread globally. The disease presentation may range from an asymptomatic state to severe pneumonia associated with acute respiratory failure.

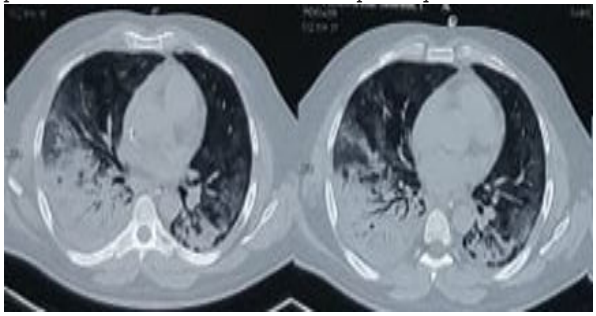

**Figure 1.0** CT Chest Showing Bilateral Consolidation.

Pulmonary radiological fndings of the novel coronavirus disease 2019 (COVID-19) have been well documented and range from scattered ground-glass infltrates in milder cases to confuent ground-glass change, dense consolidation, and crazy paving in the critically ill. However, lung cavitatory lesion has not been commonly described in these patients.

**Figure 2.0** CT Chest Showing Multiple Cavities In Right Lung.

## Methodology

we conducted a retrospective review of all patients admitted to sri aurobindo medical college and pg institute, indore, madhya pradesh from january 10th,2021 to may 30th 2021 and reviewed medical records and imaging to identify patients who developed pulmonary cavitatory lesion.

## RESULTS

In our study sample a total of 1105 patients, all adults were included Median (range) age was 47 (37–67) years.Sixteen out of 1105 (1.44%) patients admitted to our institution with COVID-19 developed pulmonary cavitatory lesion , comprising 2.20% (n=16/725) of patients who developed COVID-19 pneumonia, and 4.21% (n=16/380) of those admitted to the intensive care unit.We describe the imaging characteristics of the cavitatory lesion and present the clinical, pharmacological, laboratory, and microbiological parameters for these patients. In this cohort 9 patients have died, and 7 discharged home.

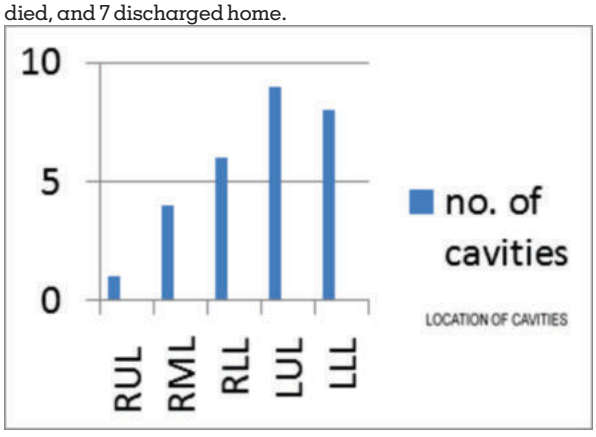


**Figure 3.0** Bar Diagram Showing Location Of Cavities

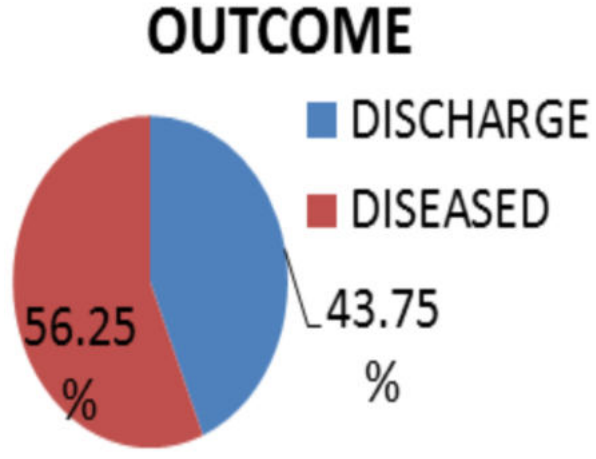


**Figure 4.0** Pie Chart Showing Outcome Of Patient

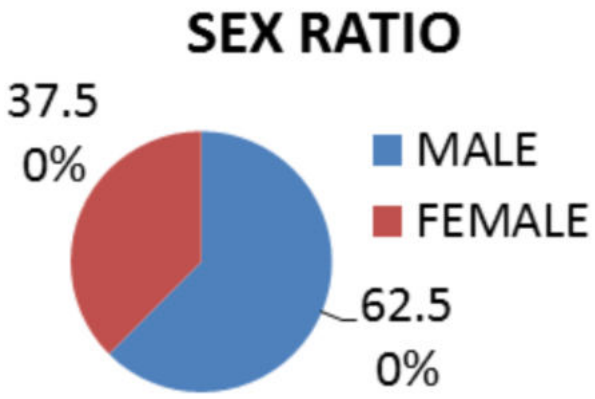


**Figure 5.0** Pie Chart Showing Sex Ratio

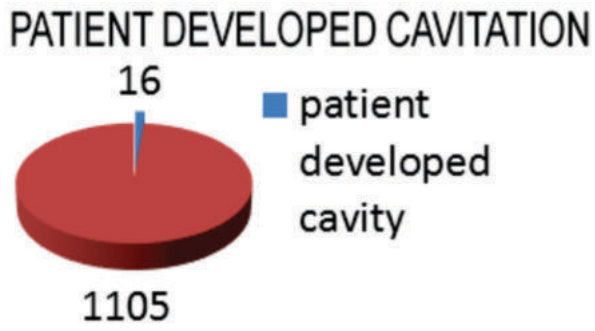


**Figure 6.0** Patient Developed Lung Cavitation

## DISCUSSION

Te development of pulmonary cavitatory lesion in patients with severe COVID-19 lung disease treated in our institution's ICU was not a rare event (4.21%, n=16/380).This subgroup of patients had severe infection with acute respiratory distress syndrome (ARDS) and required a ICU stay.Median (range) Sequential Organ Failure Assessment (SOFA) score was 23 (range 16–24) on admission, and all patients were leucopenic.By defnition, a cavity is an air-flled space forming within an area of pulmonary consolidation, mass or nodule, as a result of liquefication of the necrotic portion of the lesion and the discharge of this necrotic material through the bronchial tree. This exact process occurred in our patients as cavities formed in areas of the lung where ground glass opacities were seen in earlier stages, convert into more dense consolidation, later developing necrosis and finally cavitating.It is uncommon for viral pneumonia , including those due to the other human coronavirus SARS-CoV and MERS-CoV , to cause lung cavitatory lesion even in severe and advanced viral infection. We are unable to find the cause whether bacterial infection and/ or invasive fungal co-infection have contributed to the development of the cavities, or if the infections were opportunistic. Cavitary lung lesions are commonly related to mycobacterial, parasitic, fungal, autoimmune or neoplastic etiologies. Typical CT imaging features of COVID-19 include ground-glass opacities, primarily in the lower lobes. In our study, cavitatory lesion predominantly occurred in the left lung, whereas lung emboli were primarily noticed in the right lung. The velocity of the development of multiple cavitary lesions in a few weeks was felt to be atypical for *Mycobacterium tuberculosis* or fungal infections such as aspergillosis and most likely related to complications from COVID-19 pneumonia. Lung cavitatory lesion due to COVID-19 pneumonia is not common. Although the exact mechanism of lung cavitatory lesion in COVID-19 pneumonia is unknown, it may be related to diffuse alveolar damage, intra-alveolar haemorrhage and necrosis of parenchymal cells. While most cases are self-limited and managed conservatively.The clinical spectrum of disease secondary to SARS-CoV2 continues to evolve. Early and late complications associated with COVID-19 are still unknown.

Common causes of lung cavitation must be investigated appropriately in all patients. Clinicians must be aware of evolving CT findings of COVID-19 and arrange appropriate follow-up of patients with COVID-19 to ensure complete recovery.Four of sixteen patients who had developed lung cavitatory lesion (including two of the survivors) had no microbiological, serological, clinical or distinct radiological characteristics of invasive fungal infection and did not receive treatment for this.However, these four patients did have infection with bacterial organisms known to cause cavitatory lesion. Infection with mycobacterium tuberculosis (MTB) is also a common cause of lung cavitatory lesion, it has been described as a coinfection in COVID-19 patients resulting in cavity formation. However, in all 16 of our patients, MTB infection was ruled out based on negative Acid-Fast Bacilli on smear and culture of multiple respiratory specimens.We therefore hypothesize that the causes of cavitatory lesion in these patients was multifactorial, with contributing factors including: bacterial and fungal co-infection; the immunosuppressive effects of glucocorticoids and tocilizumab; SARS-CoV-2 specifc infammatory pathways; the COVID-19 related predisposition to venous thromboembolism and potential to cause infarct and micro-infarcts leading to cavitatory lesion; and the severe morbidity of this patient population.Four patients developed hemoptysis and all had features of suspected invasive aspergillosis. Hemoptysis appeared to have occurred irrespective of cavity size. Similarly, secondary pneumothorax also occurred in patients with both larger and smaller cavities.

## CONCLUSION

This study highlights that lung cavitatory lesion in patients with severe COVID-19 lung disease can occur, is associated with secondary complications of hemoptysis, pneumothorax, and confers a poor prognosis. Early cross sectional imaging should be considered if there is suspicion of cavitatory lesion on plain radiographs, and a more aggressive investigation and treatment of possible invasive fungal infection undertaken. Further studies are needed to determine whether treatment with tocilizumab, systemic glucocorticoids or a combination of both may increase the risk of developing lung cavitatory lesion in patients with COVID-19.

## REFERENCES


1. World Health Organization. Coronavirus disease 2019 (COVID-19) situa- tion report—156. https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200624-covid-19-sitrep-156.pdf?sfvrsn=af42e 480_2.
2. Zoumot, Z., Bonilla, MF., Wahla, A.S. *et al.* Pulmonary cavitation: an under-recognized late complication of severe COVID-19 lung disease. *BMC Pulm Med* 21, 24 (2021). https://doi.org/10.1186/s12890-020-01379-1.
3. Kong W, Agarwal PP. Chest imaging appearance of COVID-19 infection. Radiol Cardiothorac Imaging. 2020;2(1):e200028. https://doi.org/10.1148/ryct.2020200028.
4. Li X, Zeng X, Liu B, Yu Y. COVID-19 infection presenting with CT halo sign. Radiol Cardiothorac Imaging. 2020;2(1):e200026. https://doi.org/10.1148/ryct.2020200026.
5. Salehi S, Abedi A, Balakrishnan S, Gholamrezanezhad A. Coronavirus disease 2019 (COVID-19): a systematic review of imaging fndings in 919 patients. Am J Roentgenol. 2020;215(1):87–93. https://doi.org/10.2214/AJR.20.23034.
6. Chung M, Bernheim A, Mei X, et al.. Ct imaging features of 2019 novel coronavirus (2019-nCoV). *Radiology* 2020;295:202–7. 10.1148/radiol.2020200230
7. Haseli S, Khalili N, Bakhshayeshkaram M, et al.. Lobar distribution of COVID-19 pneumonia based on chest computed tomography findings; a retrospective study. *Arch Acad Emerg Med* 2020;8:e55.
8. Teng E, Bennett L, Morelli T, et al.. An unusual presentation of pulmonary embolism leading to infarction, cavitation, abscess formation and bronchopleural fistulation [published correction appears in BMJ Case Rep. *BMJ Case Rep* 2018;2018.
9. Koroscil MT, Hauser TR. Acute pulmonary embolism leading to cavitation and large pulmonary abscess: a rare complication of pulmonary infarction. *Respir Med Case Rep* 2017;20:72–4. 10.1016/j.rmcr.2016.12.001
10. Chen Y, Chen W, Zhou J, et al.. Large pulmonary cavity in COVID-19 cured patient case report. *Ann Palliat Med* 2020;9:5–452. 10.21037/apm-20-452