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Vulnerability of lung infection in covid recovered patients

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Lung damage of covid recovered patients worsens for a while and then improves with treatment and time depending on comorbidities and risk factors



COVID-19, caused by the SAARS-COV-2 virus, can affect any organs of the body during its acute infective stage and the lungs are one of the common and vulnerable organs that get affected. If severe pulmonary involvement is seen, then there are oxygen fluctuations as COVID-19 pneumonia can cause respiratory failure, acute respiratory distress syndrome (ARDS), sepsis, septic shock, thromboembolism (blood clots), and/ or multiorgan failure (MODS) which can affect the heart, liver or kidneys.

It was earlier thought that COVID-19 would just affect the elderly and individuals with comorbidities like diabetes, hypertension, obesity and kidney diseases, but with the second wave and the COVID-19 variants, we are now wiser and know that the clinical presentations and vulnerable populations would change.

Severity of COVID-19 on lungs and how fatal it can be

The SAARS-COV-2 virus is a coronavirus that enters into the human cells via the ACE II receptors like a lock and key and eventually multiplies to create more and more copies of itself. Initially in the first few days of the illness which is the viremia phase the disease behaves like any other viral infection with symptoms of cough/cold/loose stools/ fever/ loss of smell/ loss of taste etc. What is unique with this disease is the switch over to the inflammatory phase where our bodies immune system becomes hyperreactive and goes into the inflammatory and cytokine storm.

In the inflammatory phase, the markers like CRP, ferritin and D-dimer increase and this results in hypoxia (reduced oxygen). Oxygen supplement or ventilatory support is given based on the severity and one could need a nasal cannula, face mask, non-rebreathing face mask, high flow nasal cannula machine, non-invasive ventilator (NIV), mechanical ventilator and lastly an ECMO machine (heart-lung bypass). The lung damage is so severe at times that a few patients need a lung transplant.

Autopsy specimens show changes like – capillary congestion, cell necrosis, ACE II hyperplasia, oedema, hyaline and myofibroblast reactions, interalveolar fibrin deposits, and squamous cell metaplasia. All these changes along with microangiopathy contribute to the type I respiratory changes seen in COVID 19 pneumonia. Treatment options are then directed towards reducing or minimising the effect of these changes in the body.

Health Conditions and impact on vulnerability to lung complications

It has been noted that the lung damage of these patients worsens for a while and then improves with treatment and time. The rate of recovery of lung damage varies from person to person and is based on comorbidities and risk factors. Steroids and blood thinners are the mainstay to recovery and at times the medications go on way beyond hospitalisations.

On imaging, the lung X-ray and CT scan of the patient show patches which are similar to ‘interstitial lung diseases’ which are a result of lung damage and fibrosis or lung scarring. Almost 80 per cent of patients become asymptomatic from pulmonary symptoms like cough and breathlessness by day 20 of the illness. There are a few patients who continue to remain symptomatic with cough, breathlessness and fatigue and it becomes important to understand if these patients are developing lung scarring. Lung fibrosis is typically permanent damage of the lung, but what we are noticing is that most of our patients are

showing reversal of these lung changes as time passes by. Antifibrotics have been used to prevent and reduce the rate of development of lung fibrosis.

There are conditions like PACS (post-acute COVID syndrome) and POTS (postural orthostatic tachycardia syndrome) which presents as easy fatiguability and palpitations and breathlessness. It is important to rule out such conditions and target treatment for the same rather than assuming that all symptoms are because of post COVID lungs.

Treatment of lung complications post covid recovery

The lung complications can be in the form of pulmonary fibrosis, persistent cough and inflammation, predisposition to blood clots, loss of muscle mass leading to severe deconditioning and easy fatiguability, nutritional derangements, diabetes and related complications.

Treatment options:

1. Pulmonary rehabilitation, chest physiotherapy, breathing exercises, pruning, breath-holding, inspiratory exercises, expiratory exercises also needed in patients with underlying obstructive airway diseases.
2. Rule out other causes like anaemia, B12 level, vitamin D levels, thyroid issues contributing to symptoms,
3. Pulmonary function testing to see if there is any benefit from inhaled medicine and if the patient has restriction and/or diffusion defect.
4. Prolonging the low dose oral steroid dose (with or without inhaled steroid dose).
5. Adding antifibrotics like pirfenidone or nintedanib (in select patients)
6. Prolonging the duration of blood thinners (antiplatelet or newer oral anticoagulants)
7. Vaccination with other common respiratory pathogens like influenza and pneumococcal to prevent secondary infections.
8. Adequate nutrition to build and rehabilitate muscle and bone mass and function.

How can patients lessen the chance of lung damage after covid?

1. In the case of moderate to severe COVID 19 pneumonia, the time of initiating the treatment is crucial. It has been noted without a doubt that starting the treatment at the right time is important. So the first step in preventing lung damage or diseases severity is not to delay the treatment. This starts from getting tested at the right time even if you have just mild symptoms.
2. If one is fit for home quarantine, then close monitoring and getting hospitalised at the right time. Checking post-walk oxygen level and pulse are crucial and any derangement in the same warrants hospitalisation and change in medication. Inflammation becomes refractory to treatment as time passes by and once the patient is in cytokine storm, most treatments don't work.
3. Initiating breathing exercises like deep breathing, breath-hold, incentive spirometry as soon as the diagnosis made. It is important to explain to patients that the initial capacity of the lung is low during the acute phase, and it increases as we see treatment response and improvement.
4. CARP (continuous awake repositioning protocol) and proning – are the techniques that have been proven effective in improving and maintaining oxygenation. Whether it prevents lung fibrosis or lung damage is not known but if the oxygen is maintained then the subsequent outcome is also favourable. Position change every two hours and achieving eight hours total of proning is ideal. In patients with ventilators, continuous 24 hours proning is also done and it has been useful.
5. Following up after discharge to see the rate of lung recovery and titrating the post-discharge medication accordingly. The protocols of what medications to continue post-discharge are very specific to each person and the reports and the recovery so follow up with the healthcare professional.
6. As discussed earlier, physiotherapy and adult vaccinations are important for lung rehabilitation.

A healthy lifestyle and addressing all your pre-existing medical conditions are important. Getting vaccinated is a proven way to prevent severe forms of COVID-19 which need hospitalisation and ICU admission. Eating the right kind of food with adequate antioxidants have also proven effective in preventing lung infections. After diagnosis, close monitoring and follow up post-discharge will help you and your healthcare provider to make decisions.

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