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POST-COVID LUNG FIBROSIS; RISK FACTORS PANDEMIC-RELATED LUNG DISEASE

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The COVID-19 pandemic, caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has affected over 700 million individuals globally, with a substantial proportion developing severe pneumonia and acute respiratory distress syndrome. As survival rates improve, attention has shifted to long-term sequelae, particularly post-COVID pulmonary fibrosis (PCPF), a condition that may affect hundreds of thousands of survivors and significantly impact respiratory function and quality of life. Understanding the natural history and risk factors of PCPF is essential for early identification, monitoring, and therapeutic intervention within the framework of propaedeutics and internal medicine.

Functional assessment reveals that reduced diffusing capacity of the lungs for carbon monoxide (DLCO) is the most prevalent and persistent pulmonary function abnormality, affecting 38-49% of survivors at 1-3 years. Multiple studies have identified consistent risk factors for PCPF development. Disease severity during acute infection is strongly associated with fibrotic sequelae, with incidence rising from 2.08% in moderate cases to 8.22% in severe case. Critical illness requiring intensive care unit admission and mechanical ventilation confers the highest risk. Advanced age consistently emerges as a significant predictor, likely reflecting reduced regenerative capacity and age-related immune dysregulation.

Laboratory parameters during acute illness provide valuable prognostic information. Elevated lactate dehydrogenase (LDH) (odds ratio [OR] 1.004, 95% confidence interval [CI] 1.000-1.007), reflecting cellular injury, independently predicts PCPF. Hypoalbuminemia (OR 0.871, 95% CI 0.778-0.974) indicates poor nutritional status and increased inflammatory burden. Elevated C-reactive protein (CRP) (adjusted OR 1.005, 95% CI 1.001-1.009), D-dimers, fibrinogen, and neutrophil-to-lymphocyte ratio (NLR) correlate with fibrotic outcomes. Interestingly, higher hemoglobin levels (1.194, 95% CI 1.032-1.387) have been paradoxically associated with increased PCPF risk, possibly reflecting hemoconcentration in severe illness.

Interstitial pulmonary involvement at presentation shows the strongest correlation with subsequent fibrosis. Comorbidities including pre-existing renal disease (3.287, 95% CI 1.260-8.580) increase susceptibility. Notably, malignancy appears inversely associated with PCPF, possibly due to competing mortality risks or treatment-related immunosuppression.

Baricitinib, a Janus kinase inhibitor, shows an unexpected association with increased fibrosis risk (5.633, 95% CI 1.642-19.548), although residual indication bias cannot be excluded. Corticosteroids, while beneficial in acute hyperinflammation, have not demonstrated consistent fibrosis prevention, and their prolonged use requires careful risk-benefit assessment.

Antifibrotic agents including nintedanib and pirfenidone, established in idiopathic pulmonary fibrosis, have biological rationale in PCPF and are under investigation, although current evidence does not support routine use. Post-COVID pulmonary fibrosis is a clinically relevant sequela with variable natural history characterized by partial regression in many but persistence or progression in a subset of patients. Key risk factors include disease severity, advanced age, elevated inflammatory markers (LDH, CRP), hypoalbuminemia, and extensive acute radiological involvement.