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HUMORAL IMMUNITY AND BONE HEALING DISORDERS IN POST-COVID PATIENTS

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Annotation

Elevations of various inflammatory markers and proinflammatory chemokines are well documented in SARS-CoV-2 infection and correlate with disease severity. SARS-CoV-2 infection increases inflammatory markers with known direct and indirect effects on bone health, including matrix metalloproteinase-1 (MMP-1) via regulation of osteoblast activity, and receptor activator of nuclear factor kappa B ligand (RANKL) via the receptor activator of nuclear factor kappa B (RANK)/osteoprotegerin (OPG) signaling pathway (RANKL/RANK/OPG), which is critical in regulating bone metabolism. Notably, TNF-α is known to synergize with interferon gamma (IFN-γ) to induce cytokine storm. This article provides scientific research information about humoral immunity and bone healing disorders in post-COVID patients.

Keywords: bone healing, Post-COVID-19, patients, bone fractures.

Relevance:

Post-COVID complications are increasingly associated with delayed and complicated bone healing. Persistent immune activation and cytokine imbalance may lead to immune-mediated disruptions in osteogenesis.

Purpose of the study:

To investigate changes in serum immunoglobulin levels (IgA, IgG, IgM, IgE) in relation to the type of fracture consolidation and COVID-19 severity.

Materials and Methods:

The study included 126 patients with long bone fractures post-COVID-19. Patients were divided into three groups: normal consolidation (n=28), delayed (n=65), and delayed with complications (n=33). Immunoglobulins were measured by Xema. Data were analyzed using SPSS 22.0 and Statistica 10.0 ($p < 0.05$).

Research Results:

IgA levels increased progressively with the severity of fracture consolidation and COVID-19, peaking in complicated cases. IgG levels were elevated in moderate to severe COVID-19 and in patients with impaired bone healing, suggesting chronic immune activation. IgM concentrations were significantly higher in delayed and complicated healing, reflecting persistent inflammation. IgE showed the most dramatic increase (up to 3.4×), especially in severe COVID-19 with complicated consolidation. The elevation of immunoglobulins correlated with the degree of post-COVID immune dysregulation.

Conclusion:

All measured immunoglobulins—especially IgE—may serve as biomarkers of delayed or complicated bone healing in post-COVID patients. Their monitoring may support early risk assessment and personalized therapeutic strategies.

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