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**ОЦЕНКА КЛИНИЧЕСКИХ ИСХОДОВ У ПАЦИЕНТОВ,  
ПЕРЕНЁСШИХ ТРАВМАТОЛОГИЧЕСКИЕ ВМЕШАТЕЛЬСТВА  
ПОСЛЕ ИНФЕКЦИИ SARS-CoV-2**

*Аннотация: В проспективном сравнительном исследовании оценены послеоперационные исходы у 27 пациентов 45–85 лет, перенёсших травматологические вмешательства. В группе постковидных пациентов (n = 12) выявлены статистически значимо худшие функциональные результаты, более длительная госпитализация и замедленная консолидация перелома по сравнению с контрольной группой (n = 15).*

*Ключевые слова: COVID-19, травматология, консолидация перелома, исходы операций, постковидный синдром, остеосинтез.*

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**ASSESSMENT OF CLINICAL OUTCOMES IN PATIENTS UNDERGOING  
TRAUMATOLOGIC PROCEDURES AFTER PRIOR SARS-CoV-2  
INFECTION**

*Abstract: This prospective comparative study evaluated postoperative outcomes in 27 patients aged 45–85 years undergoing traumatologic procedures. The post-COVID-19 group (n = 12) demonstrated significantly poorer functional recovery, longer hospital stay, and delayed bone union compared to the control group (n = 15). Prior SARS-CoV-2 infection adversely affects orthopedic surgical outcomes.*

*Keywords: COVID-19, traumatology, fracture healing, surgical outcomes, post-COVID syndrome, osteosynthesis.*

## **Introduction**

The COVID-19 pandemic, caused by the SARS-CoV-2 virus, has produced systemic effects extending well beyond the acute respiratory phase of the disease. Among the most clinically relevant late sequelae are persistent inflammatory, thromboembolic, and metabolic disturbances that may compromise tissue regeneration and functional recovery after surgical intervention. In the field of orthopedic traumatology, where outcomes critically depend on bone consolidation, soft-tissue healing, and early mobilization, these sequelae represent an underexplored but clinically significant concern [1-3].

Existing evidence indicates that prior SARS-CoV-2 infection is associated with elevated perioperative mortality, increased pulmonary complications, and prolonged hospitalization in trauma cohorts. Furthermore, the virus has been shown to induce secondary osteoporosis through pro-inflammatory cytokine release, prolonged immobilization, hypovitaminosis D, and suppression of osteogenic differentiation, all of which may delay fracture union [4].

## **Materials and methods**

A prospective comparative observational study was conducted between September 2023 and December 2024 at the Department of Traumatology and Orthopedics of the Fergana Medical Institute of Public Health, in collaboration with the Fergana Branch of the Republican Scientific Center for Emergency Medical Care. A total of 27 patients aged between 45 and 85 years (mean age  $63.4 \pm 9.7$  years) requiring elective or urgent traumatologic surgical interventions — predominantly osteosynthesis of long-bone fractures and hip arthroplasty — were enrolled.

## Results

Baseline demographic characteristics did not differ significantly between groups. The mean age in the post-COVID-19 cohort was  $64.1 \pm 10.2$  years versus  $62.9 \pm 9.3$  years in controls ( $p = 0.74$ ). Sex distribution and fracture types were also comparable. The principal clinical outcomes are summarized in Table 1.

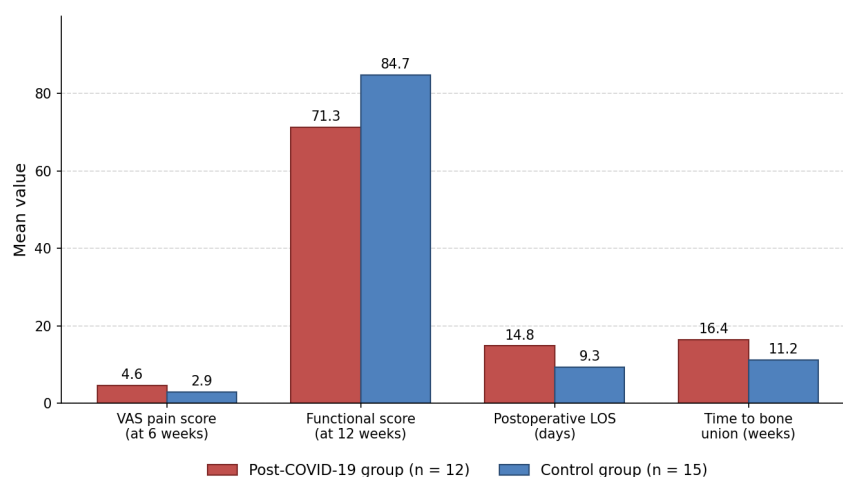
**Table 1.**

***Comparative postoperative outcomes in the study groups ( $M \pm SD$ )***

Parameter	Post-COVID-19 group (n = 12)	Control group (n = 15)	p-value
Age (years)	$64.1 \pm 10.2$	$62.9 \pm 9.3$	0.74
Postoperative LOS (days)	$14.8 \pm 3.1$	$9.3 \pm 2.4$	< 0.001
VAS pain score at 6 weeks	$4.6 \pm 1.2$	$2.9 \pm 0.9$	< 0.001
Functional score at 12 weeks	$71.3 \pm 8.5$	$84.7 \pm 6.2$	< 0.001
Time to radiographic union (weeks)	$16.4 \pm 2.7$	$11.2 \pm 1.8$	< 0.001
Wound complications, n (%)	3 (25.0%)	1 (6.7%)	0.18
Thromboembolic events, n (%)	2 (16.7%)	0 (0.0%)	0.09

As shown in Table 1, postoperative length of stay in the post-COVID-19 group exceeded that of controls by approximately 5.5 days ( $p < 0.001$ ). Pain intensity at six weeks, evaluated by the Visual Analogue Scale, was almost 1.7 times higher in patients with prior SARS-CoV-2 infection. The mean functional score at twelve weeks was  $71.3 \pm 8.5$  in the main group versus  $84.7 \pm 6.2$  in controls ( $p < 0.001$ ), reflecting clinically meaningful impairment of recovery. Radiographic bone union was reached on average 5.2 weeks later in post-COVID-19 patients ( $p < 0.001$ ), suggesting compromised osteogenic activity.

Within the main group, severely affected COVID-19 survivors ( $n = 5$ ) demonstrated worse outcomes than those with moderate disease ( $n = 7$ ), with a mean functional score of  $66.2 \pm 7.4$  versus  $74.9 \pm 7.8$  respectively, although the small subgroup size precluded definitive subgroup statistical inference. Wound healing complications and thromboembolic events occurred more frequently in the main group, although these differences did not reach statistical significance, likely due to limited cohort size.



**Figure 1.** Comparative postoperative outcomes between the post-COVID-19 group ( $n = 12$ ) and the control group ( $n = 15$ )

## Discussion

The findings of this study indicate that prior SARS-CoV-2 infection adversely affects the postoperative course of patients undergoing traumatologic procedures, particularly in the older age group. The combination of prolonged hospital stay, elevated pain scores, lower functional indices, and delayed bone union observed in the post-COVID-19 cohort is consistent with the international literature describing systemic post-COVID effects on the musculoskeletal system [5].

Several pathophysiological mechanisms may explain these observations. Persistent low-grade inflammation, characterized by elevated interleukin-6 and

tumor necrosis factor- $\alpha$ , has been shown to suppress osteoblast activity and disrupt the orderly remodeling sequence required for fracture consolidation. Concurrent endothelial dysfunction and a hypercoagulable state increase the risk of microvascular thrombosis at the fracture site, further impairing perfusion of the regenerating callus.

### **Conclusion**

Patients aged 45–85 years with prior SARS-CoV-2 infection demonstrated significantly worse postoperative outcomes following traumatologic procedures compared with COVID-19-naïve controls. Statistically significant differences were observed in postoperative length of stay, postoperative pain, functional recovery, and time to radiographic bone union. These results support the inclusion of COVID-19 history in preoperative risk stratification for orthopedic patients and underscore the need for tailored perioperative management protocols in regional trauma centers.

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